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THE
GEOGRAPHICAL REVIEW

VOL. I MARCH, 1916 NO. 3

THE DESCENT OF THE RIO GY-PARANÁ

By LEO E. MILLER
American Museum of Natural History
Member of Colonel Roosevelt's South American Expedition

It will be remembered that the Roosevelt-Rondon Expedition contemplated a division of work. The main party planned to explore the Dúvida, while a second party was to descend the Juruena and the Tapajoz, and a third party, of which the writer was a member, was to go down the Gy-Paraná. We had looked forward in eager anticipation to the end of the long ride across the Brazilian *chapadão* and the beginning of river work, but now that, thirty-seven days since leaving the upper Paraguay, the goal had been reached without serious mishap, the division of the expedition seemed to come all too soon.

To better organize the two different forces, our party had halted at a point called Sete de Setembro, ten kilometers this side of the Rio da Dúvida, while the other division had pushed on to the point of embarkation. We reached their camp early February 27, 1914, just as the tents were being taken down and the canoes loaded, preparatory to the plunge into the unknown. A short time later everything was in readiness, and farewells were exchanged with Colonel Roosevelt and with the Brazilian officers. Then, with a parting "good luck," their dugouts swung into the current and were whisked away. For several minutes we stood upon the fragile structure that bridged the unexplored river and stared at the dark forest that shut our erstwhile leader and his Brazilian companions from view; and then, filled with misgivings as to whether or not we should ever see them again, we turned our thoughts to the task before us.

Our party consisted of Captain Amilcar de Magalhães, a remarkably skilful and wholly tireless leader, and Lieutenant Joaquim de Melho, of the Brazilian Army, Dr. Euzebio Paulo de Oliveira, a geologist, and Senhor Henrique Heinisch, a taxidermist, of the Brazilian telegraphic commission, besides myself; then there were some thirty-odd *camaradas*, or native assistants. We had a very large pack train of mules and oxen, as that wing of the expedition in charge of Captain Amilcar which had

hitherto traveled ahead of the main party was to proceed with us from this point. Our plan was to continue overland to the headwaters of the Gy-Paraná and to descend that stream to the Madeira, taking observations as we went, for, in common with many of the rivers of the South American continent, the course of this stream has not been accurately mapped.[1] Zoölogically speaking, we were in a most interesting and almost unknown country, and no opportunity could be lost to add to our already large and constantly growing collection of both mammals and birds.

We left the Dúvida (now Rio Theodoro) shortly before noon; but it had rained nearly the entire day and the trail was indescribably bad; besides, the animals had completed their thirty-eighth day of travel without proper food or rest. That night we camped beside the trail on a site cleared for the purpose by the *camaradas;* we had taken only the canvas flies, as it had been found necessary to abandon the wall tents some little distance back on account of their great weight. There was no feed for the animals, but the men had cut a quantity of palm leaves growing abundantly in the forest, which the oxen refused to eat, however.

The trail had now left the open *chapadão* and wound between high walls of dark forest; instead of the monotonous level of the plain, the country was now broken and hilly, with numerous small streams trickling through the dividing ravines, and it rained almost continuously; if we had succeeded in evading the rainy season heretofore, it descended on us now with doubled vigor.

A very wide swath had been cut through the forest for the telegraph line to protect the wires from falling trunks and branches; so recent had been the work that the shriveled leaves still clung to the prostrate trees, and the thick second-growth, which springs up immediately where the sunlight is permitted to reach the ground, was just sprouting. The ground was covered with fruits of many kinds, most of them insipid or of acrid flavor, but the herds of peccaries seemed to relish them; and the flocks of parrots and macaws quarreled noisily overhead in their struggles to reach some particularly appetizing morsel. One of the things that especially attracted our attention was the great number of hard, cannonball-like shells that littered the trail; they were the empty casques of the *castanha,* or Brazil nut, which grew abundantly throughout the forest. The Indians had opened most of them, in what manner I am unable to say, as they are so hard the blows of a hammer fail to make any impression, and extracted the dozen or more triangular nuts from each. The trees upon which they

[1] The Gy-Paraná had been descended by two parties which Colonel Rondon detached for this purpose from his main expedition of 1909. The first, under the zoölogist Alipio de Mirando Ribeiro, went down the Pimenta Bueno and the Gy-Paraná to the Madeira; the second, under Lieut. Antonio Pyrineus de Souza, descended the Jarú and the Gy-Paraná (see map, Fig. 1). It was the reconnaissance survey made by the first party that established the fact that the Gy-Paraná, instead of flowing northwest throughout its course, as until then supposed, turns abruptly north in 11½° S. lat. and flows in this direction for nearly three degrees, until, at another abrupt bend in 9° S., it turns west and empties into the Madeira.—EDIT. NOTE.

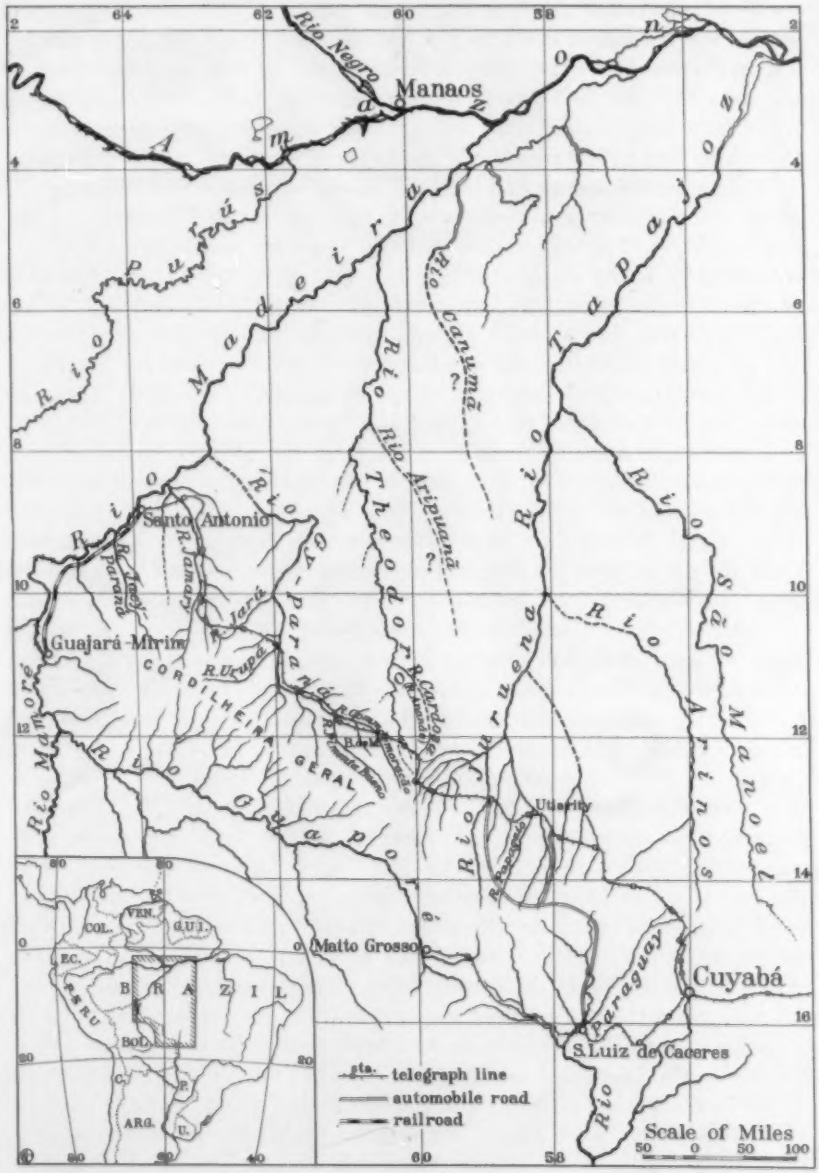

FIG. 1—Sketch map of the south-central part of the Amazon drainage system. Scale, 1:12,000,000.

The party of which the writer was a member, after leaving the main body of the Roosevelt-Rondon Expedition, descended the Rio Commemoracão and the Gy-Paraná to the Madeira. From here Manáos on the Amazon was reached by the regular steamer route down the Madeira.

The drainage between the upper Paraguay and the Madeira is based on the surveys of the Brazilian Telegraph Commission, so far as available. Note the recently explored course of the Rio Ananás (*The Geogr. Rev.*, Jan., 1916, p. 50, and Feb., pp. 143-144) and the completed telegraph line from Cuyabá to Santo Antonio (*Bull. Amer. Geogr. Soc.*, Sept., 1915, p. 693). The latter is taken from a map in the Rio de Janeiro newspaper *A Noite* for October 25, 1915.—EDIT. NOTE.

grow are remarkable for their height and great thickness; not infrequently we saw one a hundred and fifty feet high and four feet in diameter without a single branch lower than sixty or seventy feet. Graves were numerous by the wayside; I counted fifteen, near one another, each newly made mound being marked by a rude cross without name or inscription; they indicated the burial sites of *camaradas*, victims to the dread beri-beri and malaria.

During our second night's camp we heard the gruff, cough-like roar of a jaguar not far away, and next morning the men reported that the creature had killed one of the oxen. I went to see the slain animal and found that it was badly bitten about the neck and that one of the thighs had been partly eaten; in its enfeebled state the ox had supplied an easy kill for the big spotted cat. We made no attempt to follow the jaguar but shouldered our guns and started on the home stretch of the long journey. Again it rained heavily, though intermittently, and frequently the mud was knee-deep; but the knowledge that the river and rest lay but thirteen kilometers away acted as a stimulus to the men, and even the weary animals responded to the ceaseless urging of their drivers and panted along as if they, too, understood that the end of their toil was at hand.

At about four o'clock that afternoon our destination was reached. From the top of a rather high hill we had an unobstructed view down the wide, newly cleared lane through the forest; a small cluster of mud-walled, palm-thatched huts nestled in the depression at the foot of the hill, with a patch of corn and rice growing to one side; a hundred yards beyond sparkled the river, and on all sides of the little clearing rose the Amazonian forest. The little building housing the telegraphic equipment was placed at our disposal, and tents were erected for the *camaradas*, who straggled in until a late hour with the foot-sore pack train. The animals were given their liberty and bountiful feeds of corn and fodder, so that within a week many of them were in condition to start on the back trail, a comparatively easy trip, as there were no heavy loads to carry. Many of the natives were also sent back, while others were retained in the service of the expedition; one detachment was sent to the camp of the laborers who were working on the telegraph line, which extended two kilometers beyond. This was the end of the survey, Barão de Melgaço being the name of the last station, and a force of about fifty men were engaged cutting the opening for the continuation of the line. At the rate they were working it was estimated that the line to Manáos would be completed in about two years.[2]

We had expected to find a craft of some kind awaiting us so that we might immediately pursue our journey down the river, but in this we were disappointed, although, as it later developed, a boat was then on its way to us, sent by order of Colonel Rondon. There were only two small dug-outs available, which were entirely inadequate for our purpose, so the men

[2] The line was completed by the end of 1914. See "Completion of Colonel Rondon's Explorations in Matto Grosso," *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 693.—EDIT. NOTE.

were put to work cutting down a tree of large size and hollowing out a canoe which would hold the party and the necessary luggage. This work we estimated would take some weeks, so in the meantime we busied ourselves exploring the country in the vicinity of Barão de Melgaço.

A short reconnaissance through the forest revealed a veritable zoölogical wonderland. I was consequently very glad that we were delayed, as this gave me an opportunity to study the fauna of a zoölogically unknown region and to work on some of the problems of nature with which we are constantly confronted but of which so little is known. One of the facts that no field naturalist can fail to have thrust upon his notice is the exact precision and nicety with which the balance in nature is preserved. Take the familiar example of the oyster. In its early stages of development, it is subject to the raids of such a host of enemies and adverse conditions that out of a million eggs only a few bivalves reach maturity; to offset this wholesale destruction, nature has provided that a single oyster may lay several millions of eggs, and thus the race is preserved. Birds, to a less extent, are subject to this same thoughtful provision; therefore, we find that the species which are subject to many dangers during the nesting period and which undertake long, perilous seasonal migrations, lay comparatively large sets of eggs; this is best evidenced by ducks, geese, and swans. Species which are subject to the natural dangers of migration only and are protected during the nesting season, comparatively speaking, rear small broods of young; warblers, thrushes, and a number of our own native birds would come in this category; to further offset the loss, some of these latter may even rear two broods in a season. When we reach the tropics a marked change is noticeable; the extremes in climatic conditions are usually represented by the wet and dry seasons; there are few enemies and food is abundant, consequently the loss of life is comparatively small. If reproduction proceeded there at the same rate as in the northern lands, it must be obvious that the country would soon be overstocked; but again, it has been decreed that the equity should be preserved, and the great majority of tropical birds nest but once a year, and then the full complement of eggs is but two. Of course, there are a number of exceptions on each side, and on such matters it is difficult to generalize, but, in the majority of cases, this will be found to be true.

On one of my walks in the forest I came upon a troop of peculiar little monkeys of the saki family, feeding in the top of a tall wild-fig tree. They differed from all other known members of the genus by being entirely black, with snow-white noses. While feeding they were quiet, and the only thing that betrayed their presence was the constant pattering of small particles of fruit upon the dry leaves carpeting the ground. Presently they took fright, and away they went in a series of leaps and bounds, so that the tree tops were agitated as by a violent gust of wind; they uttered queer little whining squeaks as they ran and soon disappeared from view. A small

FIG. 2—Smoking rubber on the Gy-Paraná.

A flat-bladed paddle is covered with a thin layer of the latex of *Hevea brasiliensis* and turned gradually in the smoke of burning palm nuts or palm wood. A large ball of smoked rubber gradually accumulates, whereupon a slit is made to release the paddle. The paddle is controlled by the left hand and forearm thrust through the loop of a rope suspended from the roof. (Photo by Tinba.)

one of the same species which I owned was a most amusing little pet and never failed to gain a place in the affections of anyone who beheld it—even the most calloused *camarada;* it was of a most playful and friendly disposition and, if petted, made the most ridiculous faces and bubbled with laughter. Another monkey that was common in the forest was a species of *Ateles,* or spider monkey, which is very appropriately named on account of its slender build and long, wiry arms and legs; it also is of a black color, and swings its way through the branches much after the order of a gibbon, although it lacks the latter's agility. The Indians are very fond of this species, both for food and as pets; but whatever epicurean merits may attach to the flesh, in appearance the creatures are most repulsive. The face is pinched and drawn, with a long-suffering expression about the eyes, while a tuft of long, stiff hair extending over the forehead like a ragged cap gives it a greater look of misery and grotesqueness. One specimen which I collected measured six feet two inches from the tips of the fingers to the tip of the tail.

Birds were not uncommon but rather hard to observe on account of the density of the vegetation. Near the river stretched a wide band of bamboo, beautiful to look upon but impossible to penetrate without the aid of a machete. Just beyond, the trees grew tall and in close proximity, giant *castanhas, Hevcas,* and ironwoods intermingling their branches to form a canopy of deepest green, impervious to sunlight and through which rain filtered slowly; palms, ferns, and thorny shrubbery formed a dense undergrowth, so that progress at best was slow. From all sides came the clear, ringing *"hoo-whee-whee-hoo"* of the gold bird, or whistling *cotinga,* often misnamed the bell-bird; and although the sound came from but a few feet overhead, it was usually impossible to locate the dull, slate-colored songster perched motionless on a well-screened branch. The smaller species of birds traveled in large flocks, doubtless deriving some mutual benefit from this mode of living; usually the band was preceded by a few scouting brown woodhewers, some with slender bills four inches long bent in a half circle, flitting silently from trunk to trunk, lighting low down and running up rapidly, while they searched the crevices in the bark for insects; then came the vast host of vireos, warblers, flycatchers, tanagers, and woodpeckers, completely investing the trees in their all-absorbing quest of a livelihood. Twigs snapped, seeds dropped, the woods seemed full of fluttering wings and chirping voices; but in a few moments the noise grew faint and stopped; the tireless army had gone its way, and the vanguard of trogons, resplendent creatures with blood-red breasts and metallic green backs, suddenly appeared, hovered in mid-air to snap off an enticing fruit, and then hurried away. Occasionally we were fortunate enough to shoot a curassow, a large turkey-like bird, and then our Brazilian chef prepared the national dish called *canja;* it consists of a fowl and rice boiled together and is delicious.

Work on the dug-out progressed slowly, on account of its large size; a section of the trunk, some thirty feet long, had been cut off where the tree had fallen, and this was being hollowed out with adzes, while short-handled axes were used in dressing down the exterior. After twelve days of continuous hewing the dugout began to assume the appearance of a seaworthy craft, and we figured that she would be ready to launch at the end of another two weeks; but the next day a *batelão* arrived. Her captain had been fighting his way up the Gy-Paraná over three months in his efforts to reach Barão de Melgaço, having been sent from the Madeira by order of Colonel Rondon.

We loaded our meager outfit into the *batelão,* which was a good-sized craft built of boards nailed over heavy wooden ribs, and with a squared tree-trunk for a keel; an arched palm-leaf roof covered a section in the center, under which we sat to avoid the rain or sun. This style of boat is in general use on the larger tropical rivers and corresponds with the *piragua* of the Orinoco and the *champan* of the Magdalena. A crew of eighteen men was mustered, all of whom were more than willing to leave their pestilential environs, and we were soon shooting downstream with the rapid current. Captain Amilcar had gone on ahead with the small canoes in order to survey the river. They carried a sighting rod with red discs and a telemeter for measuring distances; a compass gave them the direction.

A quarter of an hour after starting we reached the camp of the telegraphic commission and made a short stop to take aboard a number of men who were suffering with fever and beri-beri; shattered wrecks of humanity whose only hope of life lay in flight. I saw a number of the *camaradas* who had come across Matto Grosso with us, and it was surprising to note the great change which only two weeks in the steaming, insect-infested forest had wrought; several of them were already suffering from violent attacks of malaria, and their faces were colorless and sallow; others who had been in the region longer stared at the *batelão* with sunken, lustreless eyes in which not even a vestige of interest in our visit or of hope was evident; a few had apparently reached the stage where the sight of the twelve newly made mounds on the hill-top no longer aroused feelings of dread or apprehension but rather of indifference tempered with longing for a welcome release.

The Commemoracão, the headwater branch of the Gy-Paraná on which we were, is a deep river from three hundred to a thousand feet wide, with reddish water and a swift current. It was not necessary for the men to ply the oars except when rounding some short bend where steerageway was required, and this was fortunate, as it rained so much of the time that the men were glad to seek the protection offered by the covered portion of the boat. In the intervals between the deluging showers the sun blazed down mercilessly; trees on both sides of the narrow lane of water sparkled as if bedecked with jewels. In places the forest rose from the river's edge in

sheer walls of variegated green; tree-trunks, brush, and palms united into one solid battlement by mosses, climbing lilies, and ensnaring creepers. Again, clumps of graceful ita-palms leaned far out over the water and then rose in a series of stately, feather-crowned columns. At frequent intervals we had glimpses of the animal life that lurked within the impenetrable barrier of the forest fastness. Monkeys were especially plentiful, and within an hour after starting we had seen four distinct species, representing as many families; there were files of howlers, the males jet black, while the females are of a straw color, moving leisurely through the branches; troops of dainty squirrel-monkeys, with deep chestnut backs and grayish heads and white faces, scampered over the tops of the lower trees. Black spider-monkeys sat in the highest crotches and gazed down at us in stupid perplexity; and once we startled a family of woolly little night-monkeys of a grayish color which had selected a thick clump of overhanging vegetation as their diurnal sleeping place. Large flocks of blue and yellow macaws, flying two by two, crossed the river high overhead, doubtless on their way to some choice feeding-ground. Kingfishers sped away in front of the hurrying *batelão,* and from the depths of the woods came the muffled sound of an ivory-bill's tapping on a hollow trunk.

That night we reached the junction of the rivers Commemoracão and Pimenta Bueno, the latter a stream not less than a thousand yards wide, with a great volume of water. The river formed by the confluence of these two streams is known as the Gy-Paraná. We had covered a distance of eighty kilometers. In ascending, it had taken the *batelão* nineteen days to cover the same stretch of river that we had just descended in one day.

Of course, the surveying canoes could not travel at this rapid pace, so the two parties became separated. In the very beginning Captain Amilcar's party had suffered an accident which came near ending fatally for several of the men in his canoe. Their work necessitated frequent haults, and to bring the dugouts to a stop while racing down stream was no easy task; so they had adopted the method of driving them into the vegetation and then holding on to the branches while a sight was taken with the telemeter. On one of these occasions a fer-de-lance, the most deadly of all South American snakes, fully seven feet long, was shaken from the overhanging brush and fell into the canoe; the panic-stricken crew leaped into the water. Captain Amilcar retained his presence of mind and shot the snake, but in the meantime several of the men had been swept down stream and were on the verge of drowning before he could reach them; the geologist had gone to the bottom, but was rescued and revived with some difficulty; thereafter he traveled with us in the *batelão.*

There were numbers of small alligators in the river, not over four feet long, called *jacaretinga;* later on, we had the cook prepare one, as they were said to be good to eat. The flesh was of a white color, when cooked, and

FIG. 3.

FIG. 4.

FIG. 3—Type of boat used on the tropical rivers and called *batelão* in Brazil and *pirogua* in Venezuela. (Photo by Leo E. Miller.)

FIG. 4—São João on the Gy-Paraná during the season of high water. The members of the expedition had to use dugouts in going from one hut to another. (Photo by Leo E. Miller.)

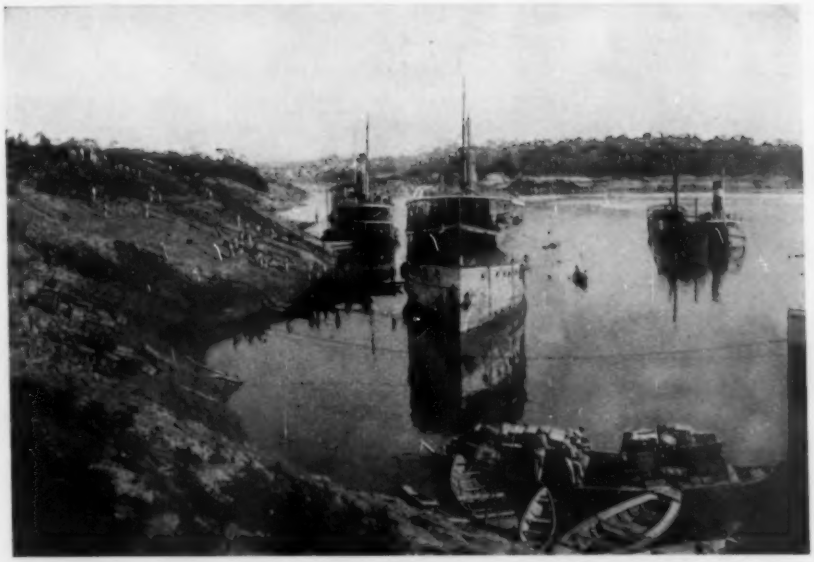

FIG. 5.

FIG 6.

FIG. 5—The port of Santo Antonio on the Madeira. Ocean-going steamships call here regularly, for, in addition to being on an historic trade route, the town is near Porto Velho, the port at the eastern terminus of the recently completed Madeira-Mamoré railroad. (Photo by Tinba.)

FIG. 6—Rubber spread out to dry, Gy-Paraná. (Photo by Leo E. Miller.)

tender, but it possessed an objectionable, muddy flavor, so that we could eat but little of it; however, the natives liked it.

The next day we covered a distance of one hundred and eight kilometers. The current in the Gy-Paraná is not so strong as in the Commemoracão, but, the weather being fair, the men pulled at the oars steadily during the twelve hours' travel with only short periods for rest and refreshment. All meals were cooked aboard, on a fire built on a box of sand in the prow. Insects were not particularly troublesome, as we kept to the middle of the stream, which, receiving the water of numerous good-sized tributaries, was constantly growing wider. There were abundant signs of the close proximity of Indians on both sides of the river. We saw some palm-leaf lean-tos used for overnight stops, with the charred sticks of a campfire in front; where the water eddied slowly against a crumbling bank, bamboo stakes protruded above the muddy stream—remnants of an ancient fish-trap,—and occasionally we passed a small, cleared spot, now overgrown with rank weeds and second-growth sprouts, which marked the site of an old plantation.

Realizing the importance of the good-will of the wild folk of whose existence in the surrounding forest there was such abundant evidence, the Brazilian government had erected a number of small bamboo and palm-leaf sheds various distances apart, near some of the more recently used trails that led from the water into the dark jungle. Under each rough lean-to a bench, made of long poles laid across sticks driven into the ground, had been built. It was the custom of the officials in going up or down the river to stop at each of these stations and place beads, knives, and trinkets on the benches as a peace-offering to the Indians; but so reticent had been the latter that not one of the articles had hitherto been touched. Great was our surprise and joy to find that all the precious offerings had been removed, and that the Indians themselves had left a number of tokens of friendship in return. There were arrows six feet long, beautifully adorned with the bright-colored feathers of trogons, toucans, and other birds; parcels of Brazil nuts neatly done up in leaves; a few ears of maize, a feather headdress, and a small pottery bowl. We collected all these treasures and left many more presents in exchange.

As we neared one of the last stations, the sound of loud hallooing came from the forest on our right. We swung the great *batelão* toward the shore. We landed, but no sooner had we climbed to the top of the steep bank than we realized how cleverly had been arranged the plan by the Indians to affect a meeting with the mysterious strangers who had invaded their realm. We followed a wide path that led into the dense forest for a distance of twenty yards and suddenly came upon a small, swift stream that sped through a dark tunnel-like opening under the dense canopy of leaves and branches. As we stared in blank amazement into the impenetrable tangle of vegetation on the other side of the stream, there emerged from the forest four nude, bronze figures, gesticulating wildly and chatter-

ing in a strange jargon which of course we could not understand; they were of good build, though inferior in physique to the Nhambiquaras we had seen on the *chapadão*, and not over five feet tall, with long, straight hair, and, remarkable though it is, the tangled hair of two of them was of a

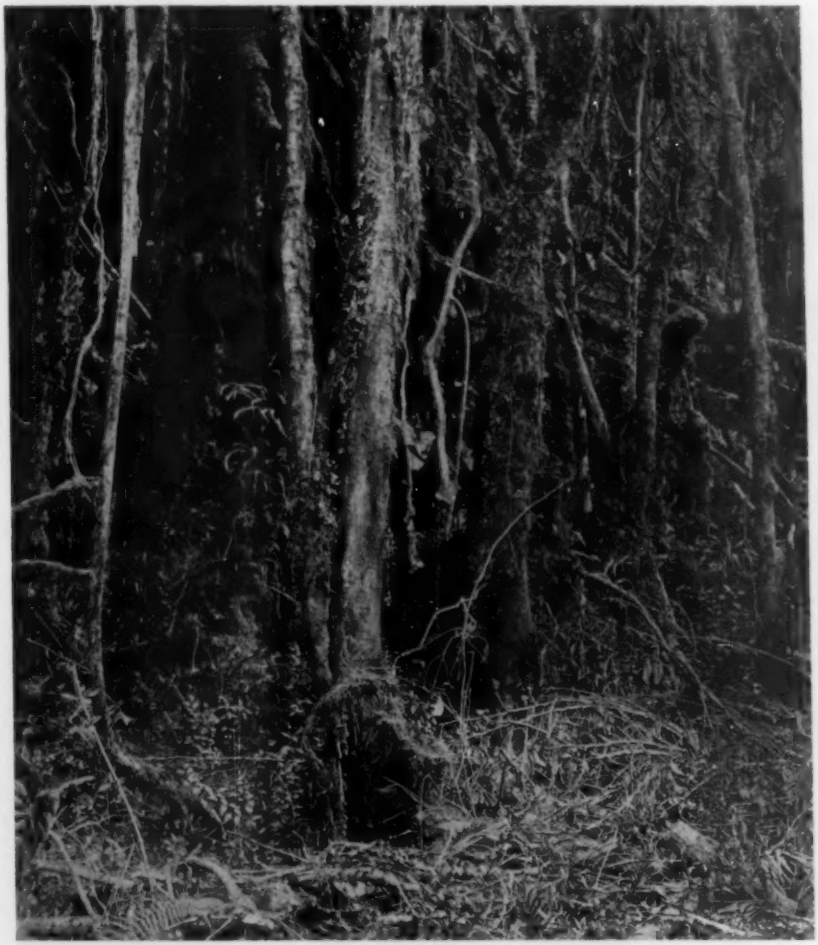

FIG. 7—The dense wall of the tropical forest. (Photo by Leo E. Miller.)

decided auburn color. Their bodies were plentifully besmeared with dark bluish paint, applied in queer zig-zag designs and giving a grotesque effect. No wilder scene can be imagined than the quartette of naked, trembling creatures faintly outlined against the dim background of merging shadows and somber green; somehow they seemed to fit into the picture and to

Fig. 8—Rapids of São Vicente on the lower Gy-Paraná. (Photo by Tinbe.)

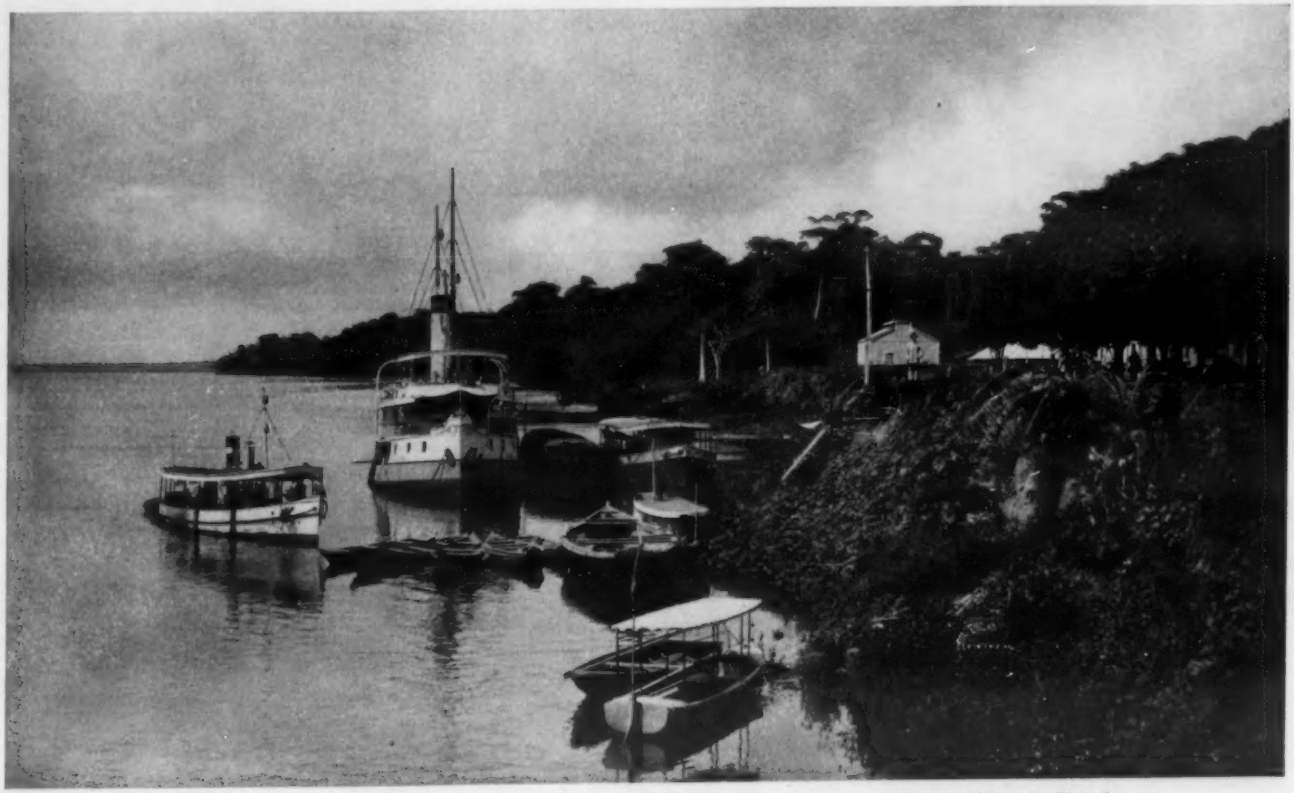

FIG. 9—Calama on the Madeira, the expedition's headquarters during its reconnaissance on that river. (Photo by Tinba.)

complete the impression of primality conveyed by the vast wilderness of the Brazilian hinterland. Our captain had held up bunches of bright red beads and started to wade into the stream towards them, but they immediately withdrew into the thick cover, so he came back. A moment later they reappeared and again began talking and waving their arms; by signs we tried to induce them to come nearer and to assure them of our peaceful intentions. Finally, after a pow-wow with his companions, one of their number approached to the margin of the stream and held out his hands. He then pointed to one of our men and motioned for him to take off his clothes and come over with the presents, which was done; the Indians grabbed the trinkets from the native's outstretched hands, gave him a violent push back and fled to his companions. This was repeated a number of times. Then we refused to permit our man to go farther than the center of the stream—the water was nearly up to his chin—and after lengthy entreaties the Indian waded out and met him half-way. We laid out an attractive assortment of beads, machetes, hatchets, and bright-colored trinkets on our side of the river and, retreating ten or fifteen feet with extended arms, invited the Indians to come over. Slowly they came, apparently with many misgivings. We approached them in a friendly manner; they made no attempt to flee, but cast meaning glances behind them where, obviously, an armed force was concealed nearby to protect them in the event that our actions aroused suspicion. The chief was an intelligent fellow; his first deed was to enact before our eyes a drama that we shall never forget. Assuming a rigid pose, he pointed straight in front of him with one hand, as if taking aim; then with a sudden "pong" he clutched at his breast and fell upon his knees, gradually sinking to the ground, where he lay moaning. We understood the accusation; one of his tribe had been shot to death by our people, probably by a rubber collector farther down the river; that was the reason why they had mistrusted us. We showed them how to use the machetes and hatchets, and they seemed delighted; but when we demonstrated the use of matches their joy knew no bounds; they yelped and danced, made weird grimaces, and tried to set the trees and bushes afire, like so many monkeys. Finally, upon our urgent invitation, the chief shouted a guttural command, and three more savages appeared instantly and joined the group, making seven in all; the late arrivals were also treated in a generous manner, and then we withdrew to our boat. Before leaving, however, we promised to return and bring more machetes and matches, which they seemed particularly to appreciate, and they in turn promised to have the bench in the palm-leaf shed heaped with bows and arrows and other things of their making, promises which were religiously kept on both sides.

Our next halt was forty kilometers farther downstream at a rubber camp known as Urupá. There were several palm-leaf huts standing on a slight elevation, so we took our hammocks and mosquito nets and spent the

night ashore. Traveling eighty kilometers the next day, we reached another rubber camp called La Pena. The surrounding forest was magnificent, and it was said that a footpath led far into the interior to the site of an old Indian village, so I decided to remain at this point a few days to collect. However, a short walk down the trail soon showed that this plan was not feasible; the whole forest was inundated to a depth of several feet, and there were so many fallen trees and clumps of thorny undergrowth that hunting was out of the question.

The next day we reached Monte Christo, the depot of a large rubber concern which has its headquarters on the Madeira; about one hundred men had congregated here to await the coming of the dry season, when they would begin collecting rubber latex from the *Hevea* trees which abound in the forest. Several long, thatched sheds housed the waiting crowd; hammocks were strung from every available post and rafter, giving the interior a cobwebby appearance, and around the edges of the huts, protected from the rain by the low, ragged roof of grass and leaves, numerous small fires smouldered over which the men boiled their rations of beans or *farinha*. There were pure blacks, descendants of slaves who had been imported into Brazil from Africa many years before; also Indians, Portuguese, and men in whose veins flowed the blood of all three of these races. Many of them were ill with fever, and had large, vile-looking ulcers or "jungle" sores, which are said to result from the bite of a small fly. This was not surprising, as the place was entirely surrounded by pools of black, stagnant water from which clouds of mosquitoes hatched, and no sanitary precautions whatever were taken against infection.

The natives are very fond of pets, and numbers of animals taken from the forest while young were enjoying their full liberty but never ventured far from the houses. There was a collared peccary, full grown and very amiable, which liked to be petted, and emitted short, low moans and grunts when anyone was near it; three curassows, dignified but restless, spent much of their time preening their feathers on a half-submerged log—they were beautiful creatures of a deep blue-black color with white underparts and a wonderful curled crest. A pair of trumpeters strutted about the camp; monkeys of the *Cebus* family and parrots of several species climbed about in the network of hammocks and added their chorus of screams and squawks to the general confusion.

We had to leave the *batelão* at Monte Christo on account of the cataract which obstructs the river at this point and carry our luggage around for a distance of half a mile. Below the rapids we found another craft similar to the one we had just left—perhaps a trifle larger—and towed by a small wood-burning launch. On the 18th of March all our things, and the sick men, several of whom were in a serious condition, were carried aboard the waiting *batelão,* and the next morning again found us on our way. The Gy-Paraná was rapidly becoming a vast, muddy sea, comparing favorably

in size to some of the larger affluents of the Orinoco, such as the Caura and the Ventuari. The character of the vegetation remained essentially the same, but some of the creepers that drooped from the tall trees and trailed in the water were covered with clusters of yellow, pink, and pale blue flowers. We saw and heard little of the animal life, as we traveled too far from the banks. In the afternoon a violent wind-storm blew up the river, accompanied by a terrific down-pour.

Soon after the storm cleared we reached São João, another rubber camp not unlike Monte Christo. The water was so high at this station that we had to use a canoe in going from one hut to another, and the whole place reeked with pestilence. It is infinitely more dangerous to traverse country of this kind than to pass through an entirely uninhabited region; the huts are fertile propagators and harborers of contagion of all kinds, to say nothing of the danger to which one is exposed on account of the more or less constant mingling with the natives. Just below São João the river is again broken by rapids; we rowed down to the beginning of the turbulent water in a canoe and then carried around to the foot of the falls. The distance is not great, but we had to cross a high, rocky hill so that we were delayed a day in making this portage. The rapids are called São Feliz and are of a formidable character, as the bed of the river is dotted with huge granite boulders over and among which the water rushes with a roar that can be heard half a mile away. During the dry season these rocks are exposed by the receding water and left covered with a thin scum of mud impregnated with salt; it is said that parrots, parrakeets, and macaws then come in thousands to eat of the saline deposit, and that they become so tame great numbers of them are killed with sticks and eaten by the rubber collectors. I saw two macaws nearly three feet in length, and of a blood-red color with blue and golden wings, that had been caught the previous year; they were magnificent creatures, but had the curious habit of spending the entire day squatting in a dark hole under the floor of their owner's hut, coming out only when hungry and at night, when they climbed to a perch above the door to sleep.

At night our men indulged in a curious native dance which I had never seen before in South America; they collected a great heap of wood and soon after supper had a roaring bonfire going; then they formed a circle with one man in the center who began to sing in a high, strained voice, and after each line the whole chorus answered with a wail that sounded something like *"oh-tee-oh-tee-ah."* The center man bowed and hopped about on one foot in a most ridiculous manner and made frequent, sudden charges into the surrounding brigade, and if he succeeded in knocking one of them down that man took his place in the middle of the ring. The whole performance looked very much like an imitation of a cock-fight. Some of the onlookers had rattles made of small calabashes full of pebbles stuck on a short piece of bamboo which they shook in rhythm with the singing; they

seemed perfectly insatiable of this form of amusement, and the dancing and howling lasted far into the night.

Below São Feliz we found another small launch, towing a *batelão* which, in the course of a day, took us to a camp called Tabajara. We had not gone more than a few miles the next morning when further progress was again barred by rapids. After a short walk we crossed a branch of the river in small dugouts and then started on a two-mile portage through the flooded forest. Another launch was waiting below the rapids, but within twenty minutes after weighing anchor we again heard the roar of troubled waters ahead of us; the river raced between high, rock-strewn banks like a brown stream of molten glass. In the distance we could see sinister flecks of white dotting the surface, while a cloud of mist hung like a pall over the river; but beyond the veil that obstructed our further view came the ominous roar of a great cataract, growing in intensity as we drew near. The landing was about a hundred yards above the brink of the first fall, but the current proved to be too strong for the launch's little engine, and we were in danger of being swept past; the moments that followed were exciting, but fortunately we managed to reach the bank. This same thing had occurred but a short time before, but the result had been disastrous; the boat was swept over the falls, and, of the thirty-one men aboard, twenty-seven were never seen again. The portage around these rapids, called São Vicente, was about a mile and a half in length and led over gently undulating country, though all heavily forested. In many places the bed rock had been uncovered by the torrential rains. This consisted of fine-grained, dark granite; naturally there was a shallow layer of sand on the rock, with a thick top covering of rich, black mould. From the top of a high knoll we had a fairly good view of the falls and of the rapids below; after leaping over a twenty-foot ledge, the river rushes through a narrow rock-filled gorge; enormous boulders tower out of the channel like so many black, unvanquished monarchs. Tongues of spray leap to a height of forty feet, and clouds of vapor rise in a constant stream. With the exception of the Salto Bello of the Rio Sacre and Utiarity Falls of the Papagaio, we had seen nothing to compare with São Vicente during our entire journey across Brazil.

That night we reached the first settlement, a small village named Doze de Novembro. We arrived tired and wet, for it had rained the greater part of the afternoon, but we congratulated ourselves upon having performed a remarkable day's work.

The place was overrun with ants, not the comparatively harmless *carregadór* ants which are content to carry away your clothing piecemeal while you sleep, but with endless armies of the fierce, black carnivorous species that prey upon every living being. These ants are one of the scourges of the tropics; whether in the fever-stricken Chocó on the west coast of Colombia, at the base of Duida on the Orinoco, or in the wilds of

Matto Grosso, the ravaging hordes seemed always the same. One moment they hurry along in solid formations, the next, side-lines have been thrown out in all directions covering many square yards of ground. Not one leaf or crevice escapes the alert scouting parties, which ascend even to the top of the tallest tree. When a victim is discovered the news in some mysterious way is flashed to the main column, and battalions of reinforcements immediately rush to the encounter, charging the prey and clinging with vise-like mandibles to any part of its body that offers a hold. Usually the approach of the devastating host is preceded by a swarm of panic-stricken insects, crawling, hopping, and flying in their endeavors to escape destruction; large, hairy tarantulas crawl to the tops of bushes and leap from leaf to leaf only to be discovered and routed, until in despair they spring to the ground, which by this time is one surging mass of ants, where they are despatched in short order. I have seen scorpions, and centipedes eight inches long, suffer a similar fate; no living thing seems to escape the avalanche of destruction. Flocks of ant-birds usually follow in the wake of the army, feeding upon the ants and upon the insects that have been driven from their hiding places. One of the questions that naturally arises in this connection is how the callow young of birds escape from the ants, as caged birds are not immune from their attacks, and dead or wounded birds placed near the army's line of march are quickly discovered, torn to shreds, and carried away. While in British Guiana, I had been watching the nest of an ant wren containing two helpless young, placed in the crotch of a tree a few feet above the ground, for several days; one morning the whole region was swarming with ants and the nest was empty; however, not long after, and also on subsequent days, both parent birds were seen contentedly carrying food into a thicket fifty yards away. A casual search failed to reveal the new nest, but to my mind there was no doubt that the young birds had been removed upon the approach of danger; one of the adults was marked in a peculiar manner so that there was no mistake in the identity of the pair. Doubtless this was an exceptional case, and in the vast majority of instances young birds perish in common with the other creatures which are overwhelmed by the ants.

On the day following our arrival at the little village, we boarded a waiting launch sent from the Madeira to meet us—the *Jayme,* she was called—and started on the final stretch down the stream; within an hour we reached the boundary line of Matto Grosso and entered the great state of Amazonas. The Gy-Paraná had assumed the proportions of a mighty river; it is doubtless one of the largest, if not the longest affluent of the Madeira, and frequently the distance between banks was not less than half a league. The water was yellow and there was little current; frequently we ran into drifts of floating trees, branches, and patches of grass that had been washed out of the flooded areas. There was no opening in the tall, tropical forest which stretched into the distance and disappeared

in one long, unbroken vista of deepest green. Toward evening we reached the mouth of the Gy-Paraná, and entered the vast muddy expanse of the Madeira; we crossed to the other side and landed at a small port called Calama, the home of Senhor Asensi, owner of the rubber camps we had passed on the last days of our journey down the river. Senhor Asensi very courteously placed his comfortable home at our disposal and suggested that we remain as his guests until we had in some measure recuperated from our rather trying experiences, and we were glad to accept his hospitality. Practically every member of the party had suffered from frequent and severe attacks of fever, although half a gram of quinine had been taken by each one daily, and some of the *camaradas* were so ill that they had to be carried ashore; the latter were sent to Manáos for medical treatment on the first available steamer. I was particularly eager to spend some time at Calama, as the locality appeared to offer unusual opportunities for zoölogical work. After a few days of thorough rest the Brazilian members of the party started up river to Santo Antonio, for a tour of the Madeira-Mamoré railroad, while I remained to investigate the fauna of the region.

The country back of Calama is high and undulating, so that it remains untouched by the water that covers the lowlands during the wet season. A small space which had been cleared around the building was covered by a fine growth of grass and low bushes and served as pasture for a few head of cattle; small birds, such as flycatchers, grass finches, and tanagers teemed in the opening, and many short-tailed, green parrots squawked in the tree-tops at the edge of the forest. A short distance below the landing there was an extensive swamp and many small brush-covered islands; masses of aquatic plants floated in the quiet, open pools, conspicuous among which was the beautiful *Victoria regia* with leaves four feet in diameter. In the dense tangled vegetation that grew out of the black depths of the murky swamp water we found flocks of *hoatzins,* or lizard-birds, curious archaic creatures which retain some of the characteristics of their reptilian ancestors; they are about the size of a pheasant, of an olive color above and yellowish below; a high crest crowns the head, and they possess only a limited power of flight. It was the height of the nesting season, and many of the fragile platforms of sticks contained two or three yellowish eggs, heavily spotted with reddish-brown; the wings of the young are provided with long, sharp claws which enable them to climb about over the branches like lizards, hence their name.

All traveling through the swamp had to be done in a canoe; and pushing the dugout through the almost solid mass of branches and creepers was a difficult task. Every twig seemed to swarm with small red ants, called fire-ants, on account of the intense burning sensation produced by their bites, and they were constantly dropping upon us in scores. Several times we blundered into *maribundi* nests, and in each instance the outraged wasps

promptly retaliated. Large *iguanas* jumped out of the trees into the water with a loud splash as we passed underneath, and troops of woolly monkeys deserted the wild cashew trees in which they fed and beat a hasty retreat. The swamp was full of life, but we rarely recovered anything we shot; the caymans and *piranhas* with which the water was infested usually snapped up our specimens before we could reach them. At night we set throw-lines and caught the great *pacu*, a fish of the *piranha* family; but unlike its blood-thirsty relative it prefers a vegetable diet. A *pirarucú*, six feet long and weighing two hundred and fifty pounds, was also taken; this is the largest fish that inhabits Amazonian waters; the scales are an inch and a half in diameter and of a silvery color, those of the latter half of the body being margined with deep scarlet.

The forest back of Calama contained about as much game as is ever found in one spot in South America. There were deer, agoutis, and peccaries, but it was impossible to penetrate far into the interior on account of the Parintintin Indians, who make this region their stronghold. These Indians have always maintained a hostile attitude toward the settlers. An attack was made on Calama one day at noon just as luncheon was being served; from out of dead silence of mid-day there suddenly came a shower of arrows; this was promptly answered by rifle-shots from the house, and the Indians immediately fled. Thirty bamboo arrows were gathered up, many of them five feet tall, with barbs on each side of the head; some of the shafts were wrapped with hair and skin taken from the victims of previous raids.

The Parintintins are of medium stature and well built; they are frequently at war with their near neighbors, the Mundrucus; when hostilities are in progress, which is nearly always, the front of the head is shaven, leaving only a round spot of short hair no larger than a silver half dollar in the center; the hair on the back of the head remains long.

The Mundrucus have the curious custom of preserving the heads of the Parintintins slain in battle; one of these I subsequently saw, prepared somewhat in the same manner as those formerly so highly prized by the head-hunters of Ecuador. Apparently the head had been smoked, and the eyes had been replaced with balls of pitch; it was a weird trophy, suggestive of wild orgies and cannibalistic rites performed in the depths of the jungle by the light of flickering pitch torches, and to the music of wailing reeds and deep-voiced tom-toms.

Captain Amilcar reached Calama about a week after our arrival. He had suffered a second accident, in which his canoe, all his personal effects, the instruments and practically all of his scientific data had been lost. These incidents emphasize the uncertainty of travel and exploration on the great South American waterways, and the dangers to which everyone is constantly subjected who ventures beyond the beaten paths of steamships and tourists' routes.

On April 7, the *Fortaleza*, a good-sized steamer plying between Manáos and Santo Antonio, called at Calama on her downstream journey, and we embarked for the last stage of our journey. We made excellent time, stopping only at long intervals for the purpose of taking aboard Brazil nuts. On the 9th of April we entered the Amazon, and the next morning found us steaming up the Rio Negro with Manáos visible in the distance. It had been fifty-two days since the division of the expedition at the River of Doubt.

CLIMATIC VARIATIONS AND ECONOMIC CYCLES

By ELLSWORTH HUNTINGTON, Ph.D.

Since the publication of Brückner's widely known book on "Climatic Changes Since 1700"[1] there has been a strong and growing tendency to treat climate as a dynamic instead of a static geographical force. Because of its recurrent and, as yet, unpredictable variations it continually produces new and unforeseen results, whereas the static forces act uniformly, although man's power to utilize or overcome them may increase. This new conception bids fair to produce widespread effects not only upon geography, but also in the realms of history and economics on the one hand and of general biology on the other. Two admirable examples of the new tendency are afforded by the recent essays of Pettersson,[2] the director of the Swedish Hydrographic-Biological Commission, and of Moore,[3] professor of political economy at Columbia University. Pettersson treats of present climatic cycles as illustrated in the fisheries of the Baltic Sea, and of past cycles of greater amplitude as illustrated by the history of Greenland, Iceland, and Scandinavia during the period of climatic stress which culminated in the fourteenth century. Moore treats of the cycles of our own day and points out their dominating effect upon the march of prices and hence upon the economic currents of the United States.

To begin with Moore's work, since it lies closest to our own lives, he belongs to what we may call the geographical school of economists, who believe that the products of the soil are the ultimate foundation of the world's economic structure. He argues, as do all geographers, that since the productivity of the soil varies greatly from year to year for climatic reasons, especially because of changes in rainfall, climate must be one of the vital economic forces. He does not stop with the mere statement of his belief, however, as many geographers have done, but tests it by the most rigid mathematical methods. He selects the Ohio Valley and Illinois as two typical regions of great agricultural wealth where an intensive study of rainfall is likely to prove illuminating. His first object is to determine the periodicity of the rainfall, which he does by means of harmonic analysis based on Schuster's methods. He finds a very highly developed 8-year period and a less prominent 33-year period. On the basis of these two cycles and of their "semi-harmonics," or half periods, he reconstructs a "harmonic" rainfall curve. The next step is to examine the relation of

[1] Eduard Brückner: Klimaschwankungen seit 1700, nebst Beobachtungen über die Klimaschwankungen der Diluvialzeit. 324 pp. Diagrs. *Geogr. Abhandlungen*, Vol. 4, No. 2. Vienna. 1890.

[2] O. Pettersson: Climatic Variations in Historic and Prehistoric Time. 26 pp. Maps, diagrs., ills. Reprint from *Svenska Hydrogr.-Biol. Komm. Skrifter*, No. 5.

[3] H. L. Moore: Economic Cycles: Their Law and Cause. 149 pp. Diagrs. The Macmillan Co., New York, 1914.

crops to rainfall. He selects for this purpose the corn, oats, hay, and potatoes of Illinois, which together form over 96 per cent of the value of the crops of that state. By means of correlation coefficients he finds that the critical periods are as follows:

Crop	*Critical Period*	*Correlation Coefficients*
Corn	July, August	.589
Oats	May, June, July	.290
Hay	March, April, May, June	.620
Potatoes	July, August	.666

If temperature as well as rainfall were considered, the coefficients would doubtless be still higher, especially in the case of oats. Even as they stand they are so high as to indicate a very close relation between the size of the crop and the rainfall. Hence Moore constructs harmonic curves of the crops on the basis of the cycles used for rainfall, that is 8 and 33 years, and finds that they are very similar to the rainfall curves. It seems to the writer that the use of harmonic curves is one of several points in the book that deserve criticism because they are given as if they were parts of the main argument, although in reality they are not necessary and weaken rather than strengthen it. The curves add a difficult and somewhat obtrusive mathematical element which detracts from the main thought, and they do not bring out the facts so conclusively as would the actual curves properly smoothed.

In the next chapter Moore discusses the "law of demand." He shows that the staple food crops follow the usually accepted form of this law, namely, that an abundant supply causes a fall of price while a limited supply causes a rise. Within reasonable limits the price of wheat, for example, can be predicted provided the size of the crop is known; and the size of the crop can be predicted if the weather conditions are known. This brings us to the most important part of the book. Taking the whole country, Moore investigates the average yield per acre of nine staple crops, giving to each a weight proportional to its importance. He then demonstrates that, regardless of whether the acreage is larger or smaller, the price fluctuates in proportion to the yield per acre, which in turn varies according to the weather and especially according to the rainfall. The next step is to connect this result with other economic conditions in the realms of manufacturing and distribution.

Before doing this, however, Moore turns aside to another of the matters which seem both unnecessary and inconclusive. Economists have advocated the doctrine that a small supply causes a high price and vice versa, but the conditions prevalent during hard times are thought by Moore to contradict this. When business is at its worst and the supply of manufactured goods is at its least, the prices are lowest; while when times are good and all the factories are producing their maximum output, prices rise highest. It seems to the writer that there is no real contradiction between the commonly accepted economic law and Moore's new interpretation. In the case

of crops the *supply* is the determining factor, and the price goes down when the supply is abundant. In the case of other articles the *demand* is the ruling element; the price goes down when poor crops not only make the farmer poor but compel the laborer to pay high prices for food, and thus decrease the demand for manufactured goods. It is worth while to emphasize this point because Moore's book is so important that it is sure to be widely criticized, and this is one of the easiest avenues of attack. Yet so far as the fundamental conclusions are concerned the book is so firmly grounded on a vast body of facts that its main line of argument seems unassailable. Hence this review attempts to brush aside, as it were, the parts that may arouse criticism, but which are irrelevant to the main geographical argument.

FIG. 1—Relation between cycles of yield per acre of crops (x—x—x) and cycles of the production of pig-iron (o---o---o), a lag of two years in the production of pig-iron having been eliminated. (Based on Fig. 23 in Moore's "Economic Cycles.")

The figures on the left and right represent the deviation of the yield of crops per acre and of the production of pig-iron from their respective secular trends.

To return to the outline of the book, a detailed study of pig iron, the "barometer" of trade, shows unmistakably that its price goes down when that of food products goes up, and vice versa. It does not feel the effect of scanty crops immediately, however, for there is a lag of between one and two years. The relationship is illustrated in Figure 1. The last point considered by Moore is the relation of general prices to crops and hence to weather. By means of the index numbers of "all commodities" prepared by Falkner from 1870 to 1890 and by the Bureau of Labor since 1890 he constructs the curve of general prices marked with circles in Figure 2. In this, as in the other curves, the secular change, that is, the effect of the depreciation of gold in the case of general prices and the effect of improved methods of agriculture in the yield of crops, has been eliminated.

Also the curve of prices has been pushed back four years so that what appears as 1871 is really 1875. This is legitimate. The production of pig iron is, as it were, the preliminary step in all manufacturing. If it shows a lag of one or two years, a lag of twice as much is to be expected in commodities whose production requires a much greater number of stages between the raw material and the finished products.

Moore's final conclusions may be summed up in his own words: "In the introduction to this essay it was observed that economic dynamics stand in need of a law that shall be to a changing society what the law of diminishing returns is to a society in a relatively static state. We may now formulate the law: The weather conditions represented by the rainfall in the central part of the United States, and probably in other con-

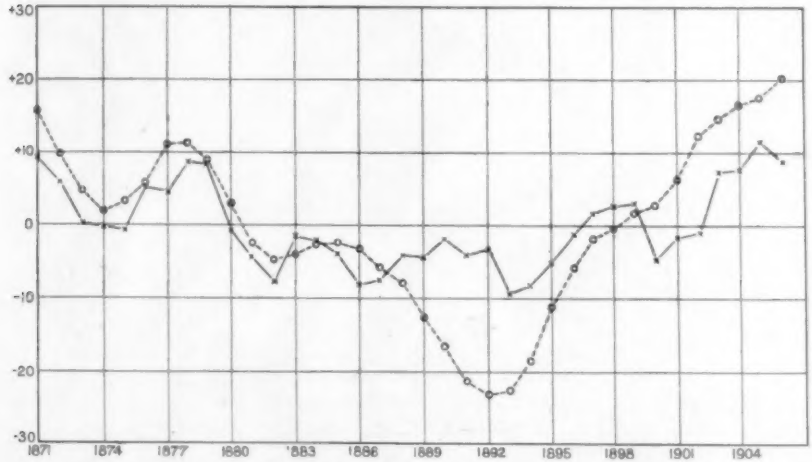

FIG. 2—Relation between cycles of yield per acre of crops (x—x—x) and cycles of general prices (o---o---o), a lag of four years in general prices having been eliminated. (Based on Fig. 27 in Moore's "Economic Cycles.")

The figures on the left represent the deviation of the yield of crops per acre and of the index of general prices from their respective secular trends.

tinental areas, pass through cycles of approximately thirty-three years and eight years in duration, causing like cycles in the yield per acre of the crops; these cycles of crops constitute the natural, material current which drags upon its surface the lagging, rhythmically changing values and prices with which the economist is more immediately concerned. . . . The principal contribution of this essay is the discovery of the law and the cause of economic cycles. The rhythm in the activity of economic life, the alternation of buoyant, purposeful expansion with aimless depression, is caused by the rhythm of the yield per acre of the crops; while the rhythm in the production of the crops is, in turn, caused by the cyclical changes in the amount of rainfall. The law of the cycles of rainfall is the law of the cycles of crops and the law of economic cycles."

It may be questioned whether Moore is really the discoverer of this law. Clayton[4] announced it in 1901 in his paper on rainfall and commercial crises. Brückner,[5] in his work on the relation of rainfall to immigration and economic distress, has stated it in effect, although not with the definite label of "law." Other geographers have discussed it under other forms, so that it may be regarded as an integral part of current geographical thought. Moore appears to have been so busy in the laborious preparation of his admirable tables that he has failed to find out how much has been done by his predecessors. Yet, after all, such criticism is of minor importance. Moore has gone much farther than his predeces-

FIG. 3—Old Norse sailing routes to Greenland. (Based on a figure in Pettersson's "Climatic Variations in Historic and Prehistoric Time.")

I, Eric the Red's route on his voyage of discovery, which became the regular route followed from 1000 to 1200; II and III, sailing routes from 1200 to 1400 according to the old sailing directions of Ivar Bårdsson. S, G, H are localities; S, Cape Snæfell on the western coast of Iceland; G, Gunbjörnskær, and H, Hafhverf, on the coast of Greenland.

sors and has removed his subject from the realm of probability to that of almost absolute certainty. Hereafter there can be little question that apart from such influences as the depreciation in gold, or great calamities like the war, the general trend of economic conditions in this country is closely dependent upon cyclical variations in the weather.

Turning now to the work of Pettersson, we find the same conclusion

[4] H. H. Clayton: Influence of Rainfall on Commerce and Politics, *Popular Science Monthly*, Vol. 60, 1901, pp. 158-165.

[5] Klimaschwankungen und Völkerwanderungen im XIX. Jahrhundert. 8 pp. *Internat. Wochenschr. für Wiss., Kunst und Technik*, March 5, 1910.

Klimaschwankungen und Völkerwanderung. Vortrag gehalten in der . . . K. Akademie der Wissenschaften am 31. Mai 1912. 24 pp. Vienna, 1912.

The Settlement of the United States as Controlled by Climate and Climatic Oscillations. *Memorial Vol. Transcontinental Excursion of 1912 of Amer. Geogr. Soc.*, pp. 125-139, New York, 1915.

under another guise. The period of climatic instability which culminated in the fourteenth century appears to have been to all intents and purposes a phase of a cycle resembling those shown in Moore's curves, but on a much larger scale. It produced correspondingly great results. Pettersson gathers the evidence of this cycle from the level of the Caspian Sea, the conditions of Lop Nor and other parts of Central Asia, the growth of the Big Trees of California, the history of Yucatan, and the records of great storms, disastrous floods, and unprecedentedly cold winters in northwestern Europe. His main discussion, however, relates to Greenland and the Vikings.

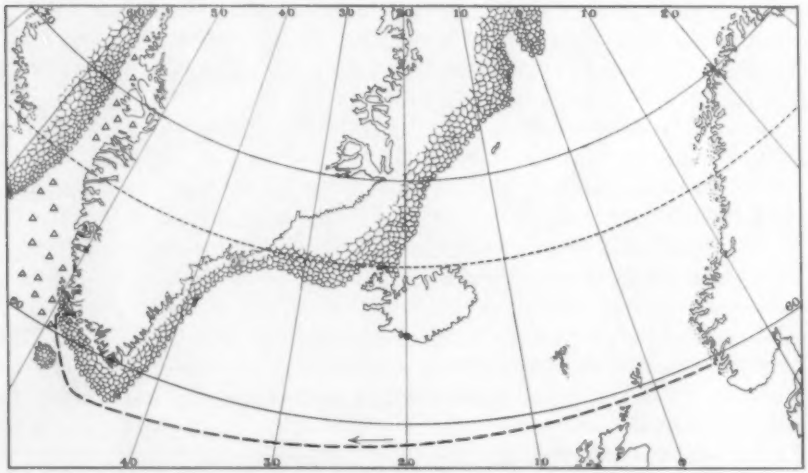

FIG. 4—Present sailing route from Norway to Greenland. (Based on a figure in Pettersson's "Climatic Variations in Historic and Prehistoric Time.") The shaded areas indicate the limit of pack ice and solid drift ice.

When Eric the Red first went from Iceland to Greenland in 982 A. D. he does not seem to have been troubled by ice. The sailing directions preserved in the old sagas show that ships at first went nearly westward from Iceland to the coast of Greenland, then southward along the coast, and through the strait which separates the island of Cape Farewell from the mainland (see Fig. 3). Such a course is now impossible because of the accumulation of floating ice (Fig. 4), yet the earlier sagas make no mention of any such hindrance. In the thirteenth century, however, there appears a warning not to make the east coast of Greenland too soon on account of the ice, while a little later the old course was completely abandoned, and ships dared not try to reach the coast of Greenland except at the southern tip or a little way northward on the west side where ice is still comparatively scarce.

Other facts bear out the conclusions derived from the ice. The sagas speak of abundant fruit of excellent quality in the warmer inner valleys

of southern Greenland, and figures are in some cases given as to the numerous cattle. Such fruit will not grow now, and the number of cattle at present is probably not over a hundred, although the population is as great as in the days of the Vikings. There is not sufficient pasturage for more. Another important fact is that ruins of old Norse villages are tucked away in almost inaccessible spots at the base of the glaciers or else in places where the level land is practically covered by ice. The Eskimos say that there are ruins of houses and churches under the ice. All these things point to a marked advance of the inland ice sheet since the days of the Vikings. The worst time seems to have been in the fourteenth century. Ships then found it difficult to reach Greenland, and the colonists were largely left to themselves. The Eskimos, too, who had previously not been troublesome, began to make raids. Pettersson thinks that this was due to the fact that the northern waters where the Eskimo had been accustomed to fish became covered with ice. Therefore economic distress began to render the people discontented and violent, and at length they raided the Norseman in answer to the demands of hunger. One of the main Norse settlements was wiped out in 1342, the other and larger disappeared after 1418.

In explanation of the mechanism of the climatic change culminating in the fourteenth century Pettersson says[6] that in the days of Greenland's prosperity "the powerful Labrador Current carried no ice . . . or, in any case, nothing comparable to the present quantity. This again reacted on the Gulf Stream. It is the drift ice of the Labrador Current which attacks the Gulf Stream south of Newfoundland and compels its warm water to spread eastward towards the submarine base of the Azores and the coastal bank of Europe. There it is joined by the warm outflow from the Mediterranean, which . . . . (extends) as far as the west coast of Ireland and forms the vast area of warm water over which the great low-pressure belt south of Iceland forms in winter. When no ice was carried by the Labrador Current and this current consequently played a less conspicuous part in oceanic circulation, the Gulf Stream 'could take a more westerly course,' as Ekholm says. Then the ice-melting took place in higher latitudes, in Baffin's Bay, in the Arctic Sea, and even in the Polar Basin. Western and northwestern Europe then possessed a more continental climate with colder and calmer winter weather."

In Norway the effect of the stormy climate of the fourteenth century, which succeeded the conditions just described, was almost as disastrous as in Greenland. Dr. Bull of Christiania is quoted by Pettersson[7] to the effect that the decay of the Norwegian kingdom at that time was not so much a consequence of political conditions as of the frequent failures of the harvest, so that grain for bread had to be imported from Lübeck, Rostock, Wismar, and other places. "The Hansa Union undertook the importation and obtained political power by its economic influence. The Norwegian

[6] *Op. cit.*, pp. 21-22. [7] *Op. cit.*, p. 22.

land-owners were forced to lower their rents. The population decreased and became impoverished. The revenue sank 60 to 70 per cent. Even the income from Church property decreased. In 1367 corn was imported from Lübeck to a value of 500,000 kroner. The trade balance inclined to the disadvantage of Norway, whose sole article for export at that time was dried fish. Dr. Bull draws a comparison with the conditions described in the sagas when Nordland [on the Arctic Circle] produced enough corn to feed the inhabitants of the country. In the time of Asbjörn Selsbane the chieftains in Trondenäs [still farther north, in latitude 69°] grew so much corn that they did not need to go south to buy corn unless three successive years of dearth had occurred. The province of Trondhjem exported wheat to Iceland and so on. Probably the turbulent political state of Scandinavia at the end of the Middle Ages was in a great measure due to unfavorable climatic conditions, which lowered the standard of life, and not entirely to misgovernment and political strife, as has hitherto been taken for granted."

Evidently the economic law here illustrated by Pettersson is the same as that found in America by Moore, but with appropriate modifications, because conditions of abundant rainfall that are favorable in the central United States are unfavorable in Scandinavia and Greenland. If Norway had not suffered such distress she might have been able to succor her colonies across the Atlantic and save them in spite of the Eskimos. If that had happened the history of America would assuredly have been different.

Pettersson's paper is of great value not merely for its discussion of the economic effects of climatic cycles but for its suggestions as to the cause of such cycles. A prolonged series of oceanographic studies has led him to the discovery that variations in tidal intensity, due to the relative position of the moon at perigee and apogee, can be detected in the flow of water into the Kattegat and Baltic as determined by the level at which a certain salinity is found. They can also be detected by means of the migrations of fish, especially herrings. The smallest main cycle lasts eighteen years. In the part of this cycle when the tides are strong and the currents from the Atlantic consequently extend far toward or into the Baltic, the fish move in the same direction. The number of herrings caught off the southwest coast of Sweden is almost invariably at a maximum when the tide-generating forces are at a maximum, but greatly declines when the force is at a minimum,—another striking influence of the control of a dynamic geographical environment over economic conditions.

A study of wider periodicities of the tides shows that the perigee of the moon and the perihelion of the earth coincide in direction once in about 1,800 years, or, specifically, about 3500 B. C., 1900 B. C., 250 B. C., 1433 A. D., and 3300 A. D. At such times, since the tide-raising bodies are nearer to the earth than usual, their combined forces when the moon is at

its greatest declination cause unusually high tides. This must cause unusually strong currents into the Kattegat or even the Baltic. That such is the case is indicated by the fact that in the Middle Ages from 1100 to 1500 A. D. a highly prosperous herring fishery existed in the Öresund between Copenhagen and the Swedish shore, while later it moved gradually northward into the northern Kattegat and the North Sea. As further proof of the strength of the tides Pettersson points out the many instances in which the waves overwhelmed the coasts of the Netherlands and of eastern England from the thirteenth to the fifteenth centuries. Apparently the extraordinarily high tides, joined with storms of unusual severity, were the reasons why the Zuyder Zee and other lowland tracts became permanent parts of the North Sea through the breaking down of the barriers of sand dunes that had previously protected them. On our own shores it is probable that similar high tides may account for many of the supposed evidences of an uplifting of the coast.

Thus far Pettersson's reasoning seems convincing. It is not so easy to accept his conclusions when he attributes the sharp climatic change of the fourteenth century to the effect of the tides. He thinks that the tides may have generated currents so strong that they appreciably influenced the distribution of water of various temperatures and thus altered the wind system. For instance, he shows that a larger influx of the dense salt brine of the Atlantic through the Kattegat would diminish the thickness of the light layer of comparatively fresh water which floats on top of the Baltic and forms an outward current at the Kattegat in the opposite direction from the lower current. If the fresher layer were thin, it would become cold throughout its whole mass more quickly than now and hence would be more likely to freeze. In this way a part at least of the recorded freezings of the Baltic during the Middle Ages may perhaps be explained. The tides may also have had much to do with the increased quantity of drift ice along the eastern Greenland shore in the fourteenth century and thus may have had some influence upon the location of the Gulf Stream and of the North Atlantic low-pressure area. It is worth noting that there is considerable evidence that the climatic cycle which reached a maximum in the fourteenth century appears to have been of a much more severe character than the one which caused the trees of California to grow rapidly in the tenth century. To carry this farther, however, and to suppose that tidal changes could radically alter the rainfall of California or of the far interior of Asia seems scarcely probable. Moreover, the periodicity of climatic changes indicated by the trees of California or by the lakes of Central Asia does not harmonize with the periods of the tides. Apparently climatic fluctuations are due to some other cause, which in the Middle Ages chanced to coincide with a tidal maximum.

Even though we may reject Pettersson's broader conclusion as to the effect of tides on climatic cycles, it seems highly probable that he has

discovered one of the minor causes, which, like volcanic eruptions, play an important part at certain times and places. Geologists have been prone to think that with the lapse of Croll's hypoth sis of the effects of the precession of the equinoxes upon glaciation there remained no important astronomical hypothesis based upon the movements of the earth and sun. Pettersson's work shows that this is by no means the case. His astronomical calculations are unassailable, and he finds definite terrestrial results corresponding to expectations.

In this connection it may not be amiss to call attention to two other astronomical hypotheses which are advocated in recent publications. They fail to receive much consideration because they depend on abstruse calculations upon which only the astronomer can pronounce judgment. One is the theory of Drayson, set forth in a book called "Draysonia" by A. F. R. de Horsey[8] and recently advocated in numerous articles by R. A. Marriott.[9] The gist of this is that unexplained but widely recognized discrepancies in the calculations of the obliquity of the earth's axis are due to the fact that the obliquity actually varies from a minimum of 23° 25′ 47″ to a maximum of 35° 25′ 47″ in a period of 31,682 years. Such a change would have brought the Arctic Circle down to the latitude of northern England about 13,500 B. C., and would unquestionably have produced marked climatic results. The geological as opposed to the astronomical arguments advanced in support of this hypothesis are not convincing. For instance, they pay no attention to glacial stages and other minor climatic cycles such as the one discussed by Pettersson. Nevertheless until astronomers agree as to the cause and extent of the variation in the obliquity of the earth's axis, we cannot say absolutely that this hypothesis is to be discarded.

Another hypothesis of the same kind is that of F. J. B. Cordeiro.[10] He holds that since the earth is acknowledged by physicists to be slightly elastic and not absolutely rigid, it must possess a gyroscopic motion. If this is so, it appears that the obliquity of the earth's axis must be subject to a secular variation of long period. This, Cordeiro holds, would cause the obliquity to vary from zero, at which time a warm climate would prevail at the poles, to an angle greater than that of the present time, which would give rise to glaciation. The movements back and forth must in any case be extremely slow, much slower than those postulated by Drayson. The testing of this hypothesis demands such abstruse calculations that no one but a highly trained mathematician can follow them. Moreover, the variables are so numerous that only the broadest approximations are possible.

The reason for introducing these hypotheses here is that such work as

[8] vii and 76 pp. Diagrs. Longmans, Green & Co., New York, 1911.

[9] *E. g.*, Changes of Climate: The Glacial Period Explained, *Candid Quart. Rev.*, 1914, August, pp. 757-782. Letchworth, England.

[10] The Gyroscope. vii and 105 pp. Ills. Spon & Chamberlain, New York, 1913.

that of Moore and Pettersson is rapidly leading to the conclusion that climatic cycles of all grades are of great importance, not merely in geological times, as has long been recognized, but in human history and in our own personal affairs. Therefore the necessity of understanding their causes is correspondingly urgent. We cannot reach a true solution unless the many possibilities are viewed without bias. The carbonic acid hypothesis, the hypothesis of crustal deformation, the solar hypothesis in its various forms, and the volcanic hypothesis are all before us. The work of Pettersson, together with the other more tentative hypotheses described above, suggests that the purely astronomical hypothesis must also be considered. In its lunar form it offers explanations of small phenomena with cycles varying from 3 to 1,800 years and in its other forms it offers explanation of cycles of 30,000 or more years, and of those of still greater magnitude. Such cycles have apparently existed, whatever may be their cause. Their economic effects upon man, and the corresponding effects upon plants and animals, must have been vital.

ARIDITY AND HUMIDITY MAPS OF THE UNITED STATES

By MARK JEFFERSON

How can we represent simply and clearly what a geographer regards as the essential facts of rainfall—the facts that condition life in the United States? The two accompanying maps are an attempt to answer the question.

The facts of precipitation are taken from the latest rainfall map by Henry Gannett.[1] Gannett's maps of rainfall have always appealed to the writer because they pay attention to mountain contouring and utilize well-ascertained facts about mountain rainfall and vegetation as well as records of rain gages. A rain gage, if properly exposed, may give a good idea of the rainfall of a region after ten or twenty years of observation. Even if badly exposed, as many gages are, it may give some idea of the local precipitation. Likewise a forest in a treeless region hints very definitely at greater rainfall where it stands than roundabout. It is true that a forest cannot tell us how many inches of rain fall in its area, yet if the fall on the treeless lands about it is a little less than some critical amount, as 10 inches, for instance, it would be no indiscretion to draw the isohyet for that value on the mountain. No geographer should hesitate to do so. The meteorologist who declines to do so should entitle his map one of "average gage readings" rather than of "normal precipitation."

That is precisely what the precipitation charts of the Weather Bureau are. Refer, for example, to that in the "Statistical Atlas of the United States," 1914.[2] The Wasatch Range is there marked 15 inches, plus. All the gages are on the lower ground, of course; the highest at Soldier Summit and Ibapah, both places 7,500 feet above the sea. The summits of the Wasatch rise above 12,000 feet. Of the fifty-seven stations where rain is measured in the state of Utah, twenty-two are below 5,000 feet, nineteen between 5,000 and 6,000 feet, nine between 6,000 and 7,000 feet, and seven

[1] Scale, 1:16,000,000, Pl. I, *U. S. Geol. Surv. Water-Supply Paper 301*, 1912 (also as Pl. I in each number from 302 to 312, 1912-14). The rainfall curves are drawn for every 5 inches in the interior from the Rockies to the Appalachians, and elsewhere for every 10 inches. The numbers on the curves are too small; indeed, some of them are illegible, and the draftsman has been careless in the Adirondacks and Catskills. Either the line numbered 50 inches should be numbered 40 inches, or a 40-inch line should be added.—M. J.

Gannett's earlier rainfall maps of the United States were published as follows: 1:11,900,000, Pl. I, *U. S. Geol. Surv. Water-Supply Paper 234*, 1909; 1:11,900,000, Pl. 40, *Monthly Weather Rev.*, Vol. 30, 1902; 1:29,000,000, Pl. VI, *U. S. Geol. Surv. 15th Ann. Rept.*, Part II, 1894. The 1912 map has rainfall curves only, the others have tints in addition. The 1909 edition was reproduced as a wall map, 1:3,041,280, by A. J. Nystrom & Co., Chicago, in 1915, although the more complete 1912 version was then available. Another reproduction, 1:33,500,000, in metric equivalents, of the 1909 edition, with modifications along the Canadian border, beyond which it is extended, accompanies, as Fig. 1 on p. 390, a paper by Henri Baulig on run-off and erosion in the United States in the *Annales de Géogr.*, Vol. 19, 1910. The 1894 edition is substantially reproduced in about 1:40,000,000 as Fig. 7, *U. S. Geol. Surv. 22nd Ann. Rept.*, Part IV, 1902, and as Fig. 1, *U. S. Geol. Surv. Water-Supply Paper 257*, 1911. On both these reproductions the arid district of the upper Colorado basin in northeastern Arizona and southeastern Utah is by mistake shaded to indicate 20-30 inches rainfall instead of 0-10 inches.—EDIT. NOTE.

[2] Pl. 389, scale, 1:11,900,000, Bureau of the Census, Washington, D. C., 1914. This map has rainfall curves only; for the same map with tints in addition see Pl. XXVI, *U. S. Weather Bur. Bull. Q*, 1906.

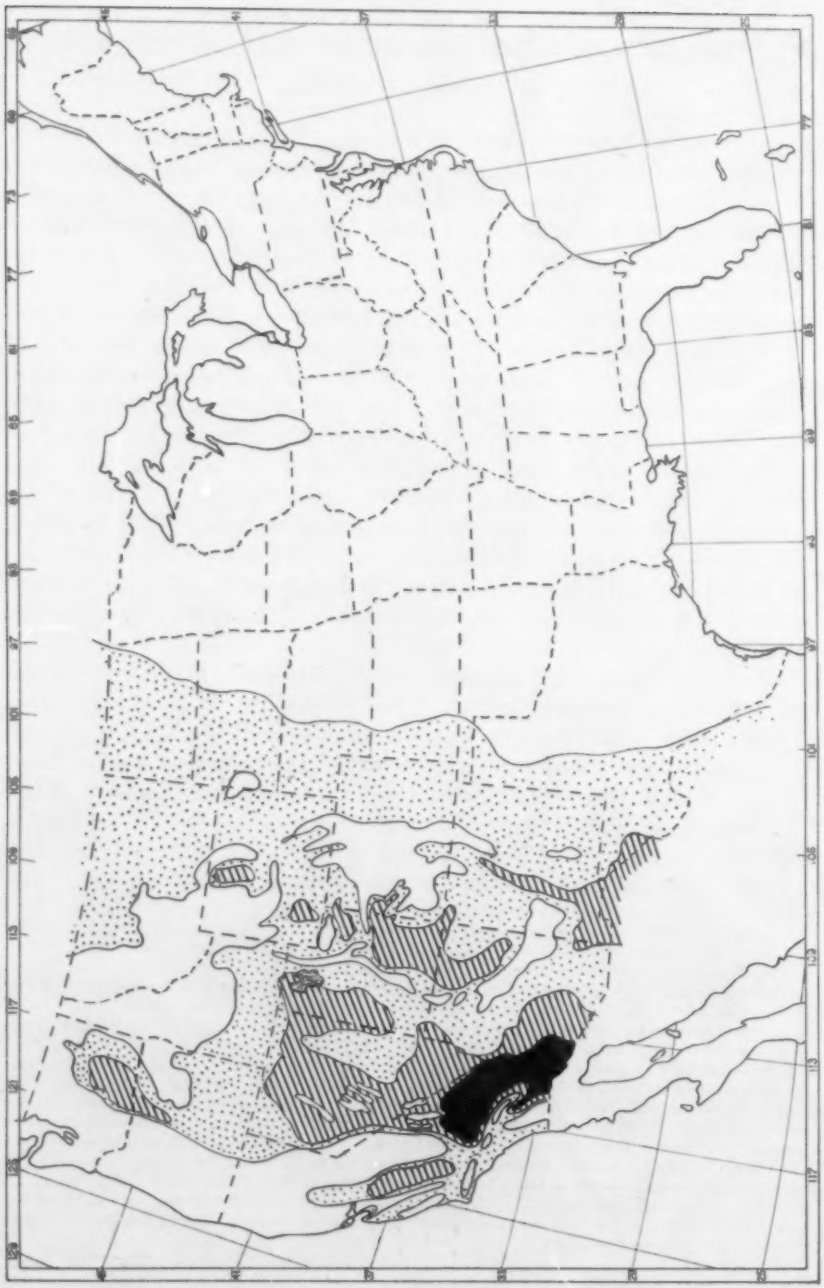

FIG. 1—The arid regions of the United States. Scale, 1:25,000,000.

Black indicates *desertic* conditions (a rainfall of less than 5 inches a year); ruled lines, *arid* conditions (5 to 10 inches); and dots, *semi-arid* conditions (10 to 20 inches). The semi-arid area contains most of the regions—only a small part of the whole—where irrigation or dry farming is possible. The precipitation of the entire shaded area, about 1,000,000 square miles in extent, may be called *semidy*.

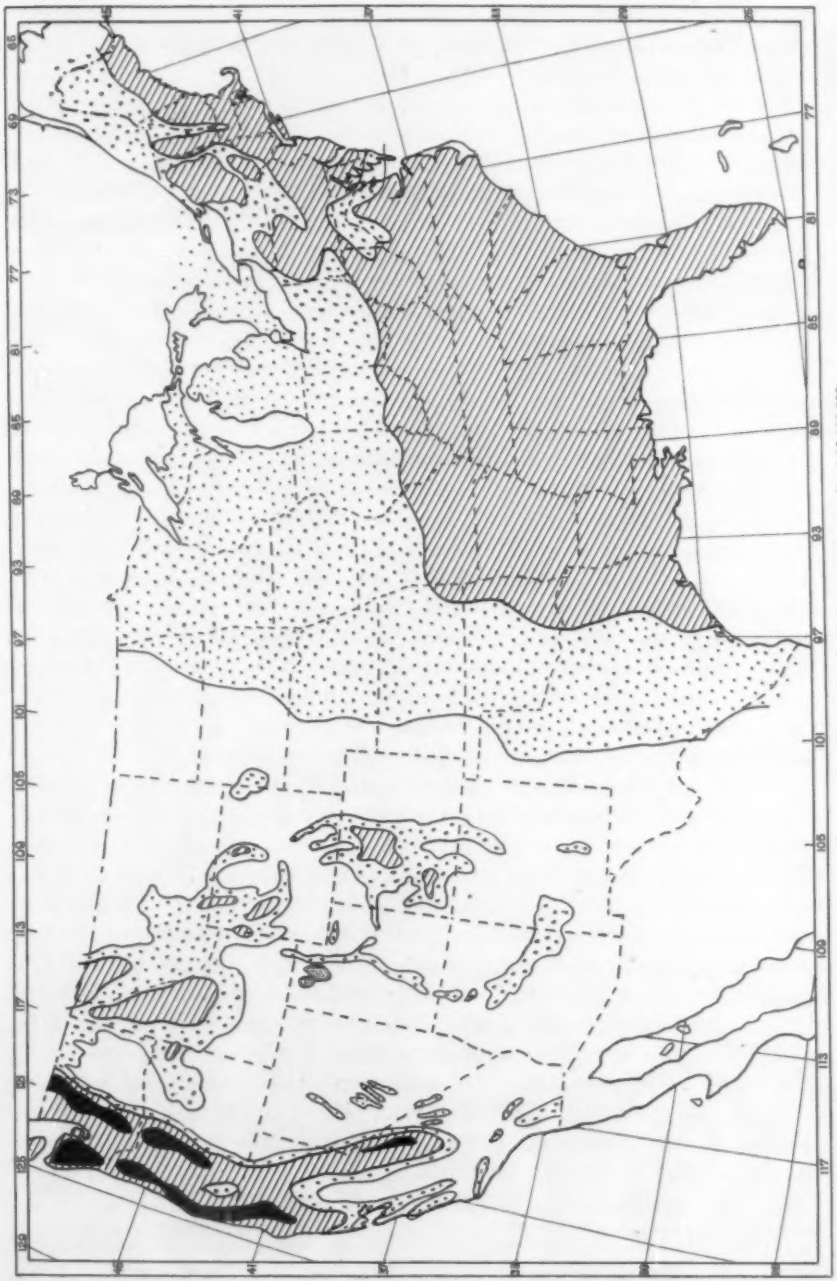

FIG. 2.—The humid regions of the United States. Scale, 1:25,000,000.

Black indicates *excessive* rainfall (over 80 inches a year); ruled lines, *abundant* rainfall (40 to 80 inches); and dots *sufficient* rainfall (20 to 40 inches). The black areas are uninhabited mountains, which promise enormous water-power for the future, however. On the other two areas live the mass of the American people, on farms, or in cities or towns.

above 7,000 feet. Above the two highest gages are 4,500 feet of mountain slopes without measurements. Here the Weather Bureau contents itself with saying the precipitation is 15 inches, plus.

A. H. Thiessen, section director for the Bureau at Salt Lake City, says on a leaflet map entitled "Normal Annual Precipitation for Utah" that the rainfall "varies from 6 to 25 inches annually at stations between 2,800 and 7,000 feet, and it is probable that as much as 30 inches or more falls at some places at the higher levels." On what does Director Thiessen base this probability for the slopes above the gages? Upon the same facts, one supposes, that caused Mr. Gannett to put a modest 20-inch isohyetal line there—namely, the mountain vegetation and the mountain streams, which could not be maintained by the amounts of rain that fall at the levels of the gages. Gannett's map runs the 20-inch line along the higher slopes of the range. If anything, it understates the truth. The geographer cannot spare this line, especially in view of the considerations set forth below, which make 20 inches a critical value. The Weather Bureau map in the "Statistical Atlas" puts 40 inches on the Sierra Nevada, and also on the Cascades. Gannett has 80 inches and 100 inches. Perhaps the most significant contrast between the two maps is on the White Mountains of New Hampshire. The Weather Bureau map does not mark them with any local increase of precipitation, but its 40-inch isohyet passes through them. Gannett puts on his map, which is considerably smaller, local isohyetal lines for 50 inches, 60 inches, and 70 inches. Special interest attaches to this case because it happens that the summit rainfall is accurately known. For fifteen complete years a station was maintained at the summit of Mount Washington. The average precipitation was 83 inches. Only twice did it fall below 50 inches.[3]

From a geographical point of view 20 and 80 inches are critical quantities, marking in a rough way the lower and upper limits of the precipitation suited to agriculture without irrigation and, therefore, to a wide occupation of the land with farms, towns, and cities. Other factors, of which evaporation and seasonal distribution are the most important, greatly influence the availability of a given amount of rain. But in a general way, 20 to 40 inches of precipitation may be called *sufficient* in our climate; from 40 to 80 inches will then be *abundant;* over 80, *excessive;* and less than 20, *scanty.* As the regions of excessive precipitation in the United States are limited, the facts may be set forth on two diagrams; one, of the grades of scanty rainfall, a diagram of *aridity;* the other, of *humidity,* on which the excessive rains are included with the sufficient and abundant. It is plain that these should be contrasted. If the maps are shaded for intensity, the shading of the two maps will grade in opposite directions.

[3] The reader who is interested in the different points of view of meteorologist and geographer as to the theory of constructing rain maps will find a symposium of views on the subject in the *Monthly Weather Rev.*, Vol. 30, 1902, pp. 205-243 (with the 1902 map by Gannett listed in footnote 1, another rainfall map by A. J. Henry, and a map showing relief, all on the same scale), though the writer cannot accept as his the opinions there ascribed to him on the basis of a communication of his on "The Reduction of Records of Rain Gages," previously published in the *Monthly Weather Rev.* (Vol. 29, 1901, pp. 499-500.)

On the aridity diagram the deepest tint will denote the driest grade and fall in the driest region. Figure 1 is such an aridity map. On it black is the tint of greatest aridity, less than 5 inches of rainfall in the year. The black region is fairly *desertic* like the Sahara, and measures some 35,000 square miles. It is almost wholly contained in southeastern California and includes the fast-drying-up Salton Sea and Death Valley, the lowest surfaces on the continent. It seems a little striking at first that the least rainfall should fall on the lowest surfaces, and both of them below sea-level. Possibly the Dead Sea, too, will recur to mind, with its surface 1,300 feet below sea-level. "Here rain hardly ever falls." Of course it is active evaporation that keeps these water surfaces low and, in the case of Death Valley, where there are no inflowing streams, keeps the bottom of the hollow bare, 225 feet below the level of the sea. Blue skies and high evaporation go with rainlessness; so these spots may be said in a way to be low because they are dry. The bottom of Lake Superior (− 406 feet) is still further below sea-level. Only the rains that fill it lift the water surface so high that it overflows at the "Soo." With desertic conditions its floor would be revealed as the lowest point of the continent. When water broke into the Salton sink from the Colorado, as happened a few years ago, it was rapidly lowered by evaporation, and the Sea will dry up again in a dozen years.

Next in aridity to the black area is the shaded one indicated by ruled lines, covering about 250,000 square miles in patches that always lie between mountain ranges—between the Cascades and the northern Rockies, between the Sierra Nevada and the Wasatch, between the Wasatch and the Colorado Rockies, between the Coast Ranges and the Sierra Nevada in California, and among the ranges of Montana and New Mexico. The precipitation in this area is from 5 to 10 inches, and the country is distinctly *arid*, with agriculture dependent on irrigation. Evaporation is active, and there is little promise for the future.

The lowest grade of aridity, a rainfall of 10 to 20 inches, is represented on the map by the dotted areas. They measure in all about 720,000 square miles, and form the lower portions of the great plateau on which stand the Rockies and the Basin Ranges between the 100th meridian and the Sierra Nevada and Cascades. This region is *semi-arid* in character. Portions of it in the north are susceptible of dry farming, and smaller portions both in the north and in the south can be supplied with water for irrigation. It is the most promising part of the arid regions and has the chief opportunity for future expansion now left within our domain. About half of these semi-arid lands are within the Great Basin, about half lie in a broad belt along the eastern front of the Rockies.

The blank remaining portion of the country is needed on the diagram to give proportion to the region of scanty rains. The blank surface emphasizes by its presence the various shadings of the arid region.

Figure 2 shows the contrasted diagram of humidity. The emphasis is

here reversed. The arid lands of the first diagram are all blank, and black, the deepest shade, represents *excessive* rainfall (over 80 inches). As an upper limit of availability for man it might have a diagram to itself were it not so restricted in area in the United States and so scattered. It lies wholly on the northern Coast Ranges and the Cascades, with a touch on the Sierra Nevada. The area where this intense precipitation occurs may be half as large again as that of desertic rainfall. Being steep mountains, it abounds in power that the swift down-pouring water generates, When the coal fields of the world are exhausted, here is an unending motive-power for industry which must some day give the Pacific coast a complete dominance in our country. Most of Figure 2 is covered by the shades for *abundant* and *sufficient* rainfall: abundant (40 to 80 inches), represented by ruled lines, an area of nearly 1,000,000 square miles in the southeast, on the Atlantic coast, in the Pacific coast valleys, and on some of the highest ranges of the Rockies; and sufficient (20 to 40 inches), the dotted area of over 1,000,000 square miles in the Great Lakes region, the prairies of the western part of the Mississippi valley, and the Rocky Mountains. In these two rainfall regions, especially the latter, live the great mass of the American people. There are most of the farms, there are twenty-nine of the fifty cities of the United States and Canada with over 100,000 people (and most of the other twenty-one are near the Atlantic coast, where the rain is little over 40 inches).

Figures 1 and 2 draw all their facts from Gannett's map. They do not exhaust it, for they omit no fewer than twelve of its isohyetal lines; yet it is believed that they help the eye to perceive and interpret some facts that the geographer wishes selected from the mass of details that must be stored in a general map of annual precipitation. In addition to the biologic significance of the facts selected and brought into relief is their genetic importance, distinguishing the aridity of the basins, which the air can only enter by descending, from the humidity of the uplands, where the air moves upward. For the professed student a detailed chart of isohyetal lines is essential, quite as a dictionary to a student of literature; but such maps do not appeal to the average man, for they do not speak plainly to him. Even the student may find that such diagrams as those here offered may help him master essential facts. They may merely serve to remind him of the conclusions of his thinking, just as a photograph of a friend hardly tells us what our friend is like, but rather serves to remind us of the pleasure we have had in knowing him.

TRADE MOVEMENTS AND THE WAR

The war continues to produce many and varied alterations in the currents of world trade. Some are obviously temporary; the permanence of others is doubtful; yet the opening up of new channels is at least suggestive. Changes are involved in the kind, amount, and value of goods carried and in the routes along which they are borne. The various consular reports and trade journals abound in illustrations.

In spite of our own greatly augmented trade with the Allies, the outstanding feature is the decline of world commerce, especially during the earlier months of the war. Scarcity of freighters and high freight rates were largely accountable. Thirteen per cent of the world's trade formerly in the hands of Germany and Austria has been removed with the exception of the still vigorous German trade in the Baltic; and of the 54 per cent of trade in the hands of the Allies a large amount has been diverted from its ordinary purposes. German steamers, for instance, had formerly carried about 40 per cent of the exports from the Dutch East Indies. On their removal the remaining companies raised the rates 50 per cent. Still greater increases are reported. From Moji, Japan, to New York, the rates on general cargo had risen 90 per cent by March, 1915.

Unusual opportunities have been afforded to neutral shipping. The *Boletín de Relaciones Exteriores,* Chile, June, 1915, says "In Spain, today, the possession of a boat constitutes a mine of money" and instances the coal freighters from Gijon to Barcelona that formerly charged seven or eight pesetas per ton and now demand three, four, and even more times as much.

Transportation by sailing ship has seen a great revival. In 1909 eight steamers were chartered to load lumber from the United States to the Rio de la Plata; sailing vessels, unable to compete, were driven from the trade; now many are returning to it. Several schooners formerly carrying coal from Chesapeake Bay to the Middle Atlantic states and New England have gone into the South American trade. A ship recently chartered in Boston to carry lumber to Buenos Aires has secured rates of twenty-two dollars per thousand feet—a record price.

Among cargoes coal occupies a prominent and somewhat peculiar position. For cheap rates coal depends on the accessibility of a market for return freight. The coaling station of Port Said was well situated in this respect, but for some time after the outbreak of the war so little freight was carried westward through the Suez Canal that rates from India fell as low as twelve shillings, though they have lately risen to fifty shillings. Since coal freights from the United Kingdom had, on the contrary, risen from nine shillings per ton to a maximum of thirty-seven shillings and six pence, it became expedient to sacrifice a part of the cargo space for the cheaper Indian coal.

Some countries have suffered heavily through inability to ship their usual export. Syria normally exports some 80 per cent of its wheat crop. The harvest of 1914 was excellent, but transportation facilities were closed; coal was wanting, and all baggage animals had been commandeered by the government. Beirut experienced a very serious shortage of flour and wheat. Adaptations to trade dislocation are illustrated by the proposal that British shipping unable to find return cargo from Morocco should carry grain from Casablanca and other points on the western coast of Morocco to relieve the French ports unable to supply freighters.

The selective action of the war has greatly favored the sugar grower. The few tropical countries that show increased export trade for 1914 have gained their advantage on sugar, thus Mauritius, with sugar representing 97 per cent of its exports, British Guiana, eastern Cuba. Other West Indian islands would report similar advances but

for local disabilities. Barbados, recovering from the drought of the past few years, is anticipating a good crop and corresponding profits for 1916. In Peru sugar has proved much the most lucrative product during the past year, though profits have been diminished by the scarcity and high charges of freighters. In April, 1915, the cost to Liverpool had almost trebled the old rate. The good market for sugar has had its customary effect on industry on the Peruvian coast. Since the Civil War and the boom in Peruvian cotton that accompanied it the sugar and cotton industries have prospered in complementary ratio. In 1913 the low price of sugar and the bull cotton market caused a considerable increase in production of the latter crop. Now the process is being reversed, and it has been further encouraged by the fact that depression came at the time when farmers were requiring money for the planting of the new crop. Like cotton, Peruvian exports of copper and petroleum have suffered from the preference for sugar shipment. The latter decreased by 44,755 tons, or 56 per cent, in the last five months of 1914. Here, however, suspension of works in the Chilean nitrate *oficinas* was a contributory cause.

Complications attendant on the readjustment of commerce are well exemplified in the American consular report from the Belgian Congo for 1914. In the latter part of 1915 the first American ship to enter the Congo delivered the first general cargo shipped thither from the United States. Despite the fact that the goods delivered proved satisfactory, the only duplicated orders have been for flour, petroleum, and a little sugar. The reason lies in part in the lack of reciprocal trade—there is no American market for the copal, cacao, palm oil products of the Congo—but still more because the present financial basis of all Congo industry lies in European hands, in Brussels, Antwerp, and Liverpool. As in the case of the previously cited money crops of Peru, external economic conditions exert a powerful control over production. Before the crop is harvested it has been sold and advances made on it by the local banks. In consequence former German imports from the Congo have been sent to Liverpool, though at a loss, for lack of a market.

There are other instances of the movement, temporary at least, away from the great European entrepôts. Cuba and Denmark, among other countries that used to obtain rice from the continental markets, have obtained shipments direct from Burma. Cuba took five times as much—over 27,000 tons—in 1915 as in the previous year. Some of the old well-established triangular routes have been abandoned for the time being. American vessels carrying manufactured goods to South Africa and returning home via Europe have lately carried return cargo, including wool, direct to America. Promise of more permanent commercial advance is in the hands of Spain. Cargoes of nitrate have been obtained from Chile without the intermediary of a French, Belgian, or German market. A proposal is on foot to connect the two countries by direct steamship service and to erect in some convenient Spanish port, preferably Barcelona, a depot to supply the whole of the agricultural zone of the Mediterranean. Of the benefits that would accrue may be noted the provision of a return cargo for vessels carrying wheat from Russia and accustomed heretofore to return in ballast, and the possibility of increased export trade with Chile. At the present time the latter country obtains practically all her imported olive oil via the United States and thus receives a product far inferior to the pure variety that could be shipped direct from the country of origin.

OVERCROWDED PORTO RICO

The Hon. Arthur Yager, Governor of Porto Rico, in a paper on the "Fundamental Social and Political Problems of Porto Rico," read at the Lake Mohonk Conference, October 22 last, gave a most suggestive and informing discussion of serious problems involving the well-being of the Porto Ricans. Probably few of our citizens have realized that the island is one of the most densely peopled parts of the earth and that food requirements bid fair to outstrip the local means of supply. In many other respects Porto Rico exhibits characteristics peculiar to island geography. Governor Yager said there is much wretchedness and poverty among the masses of the people. Their dwellings are, for the most part, mere hovels, almost devoid of furniture and crowded beyond belief. Their food consists of rice, codfish, and beans, supplemented by the native fruits. Their wages are, as a rule, barely sufficient to maintain their existence. These conditions have prevailed in Porto Rico for many years, and, while much has been done to improve and build up the island since the American occupation, it has not been possible to make any very marked improvement. The fundamental cause is the dense population, now conservatively estimated at 1,200,000 people. It was 1,118,000 in 1910, according to the official census, and it has been steadily increasing since that date.

The gross area of the island, land and water, including the small adjacent and dependent islands, is 3,435 square miles, and the present population therefore is nearly 350 to the square mile. This is a greater density than that of China proper (200 to the square mile in 1910) or of India (175) or of Japan (362). It is more than ten times greater than that of the United States proper (30.9) and over three times as great as that of New England (105.7). In fact there are only two states in the American Union that have more people per square mile, viz., Massachusetts (419) and Rhode Island (509), and in these states about three-fourths of the people live in cities and depend upon manufactures, while in Porto Rico only about 10 per cent of the people live in cities of more than 10,000 population and there are almost no manufactures. In short, if we consider both the area and the industrial development of this little island there is perhaps no region in the world, save Java, more densely populated.

The island is about four-fifths mountainous, much of it so steep that it can hardly be cultivated, and yet this great population is so evenly distributed over its whole surface that the center of population is only about 5 miles in a straight line from the geographical center of Porto Rico. Moreover, the population has been produced by the natural increase of the people of the island. There is practically no immigration and, according to the census of 1910, only about one per cent of the people are of foreign birth.

Furthermore, the population is still steadily increasing. The first census, taken by the Americans in 1899, enumerated in round numbers 953,000 persons in Porto Rico. At the present time they exceed that number by 250,000. By comparison with the census taken by the Spanish government in 1887, which enumerated 732,000, we find that in the twenty-two years immediately preceding the coming of the Americans there was an increase of 221,000 people, or about 30 per cent, while in the sixteen years since the American annexation there has been an increase of 250,000, or about 27 per cent. To put it another way, during the latter part of the Spanish period, the average annual increase was about 1.3 per cent, while during the whole of the American period, it has been 1.6 per cent. The increase last year, according to the official reports of births and deaths, was 24,000, or 2 per cent, of the whole population. This rapid increase in population has been made possible by the commercial expansion and industrial development that has followed the American occupation. This expansion is made evident by the following figures:

The production and export of coffee remain at about the same figure as in Spanish

times. The output of the sugar industry has been mutiplied by six, going up from 50,000-60,000 tons in Spanish times to about 350,000 tons at present. The export of tobacco, cigars, etc., has been increased more than ninefold, rising in value from about $1,000,000 in Spanish times to about $9,250,000 at present. The fruit industry has been created and developed entirely by the Americans, the exports, during the past year, reaching a total of about $4,500,000. The enormous increase in the exports of the whole island may be further illustrated by comparing the figures for 1901, which show total exports of slightly more than $8,500,000, with those of the present, which are about $49,330,000.

Gov. Yager added: "This large expansion of commerce has enlarged greatly the opportunities for employment among the laboring population. Instead, however, of raising the standard of living and increasing the wages of agricultural workers in any marked degree, it has resulted chiefly in a large increase of their numbers. The conclusion seems to be that Porto Rico has reached that painful stage in its economic development where the natural increase in its population has outrun the means of employment and where the standard of living has consequently been pressed down to the lowest limit.

"The people of Porto Rico are a kindly, charitable, lovable people; their patriotic love of their island home is worthy of all praise. The devotion of parents to their children, especially of the mothers to their offspring, is equal to that shown among the people of any land. But, owing to their inherited improvidence, their racial characteristics, and perhaps to the tropical climate, those checks upon population which in colder climates seem adequate to keep the increase of the people well within the limits of subsistence seem to be lacking among them. The birth rate seems to bear no relation whatever to the conditions of industry and the opportunities for employment.

"I call attention to this problem because it seems to me that those of us who are responsible for the future of the island should face it now. In my judgment it is not only important but it is urgent. With the population already pressing hard upon the means of employment, if any unexpected calamity should befall any of the island's industries there would result more serious suffering among the laboring people than the insular government could possibly relieve, with the means at its command. If, for example, a cyclone should devastate the coffee plantations, as actually happened in 1899, the situation might become very critical. Or if, as now seems certain, the protective duty on sugar should be abolished, and the decline of that great industry, which everybody predicts, should actually take place, the problem of feeding the unemployed would soon become most serious.

"What, therefore, should be done to meet and forestall the coming of even worse conditions than now exist? I do not hesitate to express my belief that the only really effective remedy is the transfer of large numbers of Porto Ricans to some other region. I do not believe that there is in history any instance of a country that has reached the overcrowded condition in which Porto Rico now stands, that ever escaped from it without the aid of emigration. Whatever can be done in other ways to improve conditions should still be done, but those things alone will not solve the problem.

"At present there seems to be only one country that lies hopefully open to a movement of Porto Ricans out of their own island, and that is Santo Domingo. Many have gone there in spite of the dangers due to the unstable political conditions. Santo Domingo is only about eighty miles from Porto Rico. It is almost identical in climate, physical characteristics, products, people, and language. On this account there would be little shock in change of residence. It has now only about thirty people to the square mile. Vast stretches of fertile virgin soil await labor, and the two islands could be made to fit together like hand and glove.

"I believe it to be the duty of the United States to make, if possible, such arrangements as may accomplish the purpose that these two neighboring islands, over which the American government has assumed complete or partial control, should supplement each other's needs with respect to population and social development. . . . Treaty arrangements might be entered into between the governments of the United States and Santo Domingo which would include a practical scheme of emigration under governmental encouragement and aid of the surplus population of the smaller island to the unoccupied lands of the larger. In this way the greatest problem of both islands would be solved through the redistribution of population. That there would arise some complications and practical difficulties in carrying out this scheme is doubtless true, but that it is feasible and practicable if undertaken earnestly, I have no doubt. That it is within the power and rights of the American Government in view of its responsibilities in both of these islands as well as in the Caribbean Sea generally seems to be clear, and that it would meet general approval among the people of both islands seems highly probable."

NEW BATHYMETRICAL CHARTS OF THE OCEANS*[1]

None of the maps hitherto available showing ocean depths, such as the Prince of Monaco's map or the maps in the *Challenger Report*, Berghaus' *Physical Atlas*, or the atlases of the Deutsche Seewarte combine in one the advantages of the present set of three maps. They are the first to represent on an equal-area projection the bathymetry of each ocean on a single sheet, on a scale small enough to afford a general survey and yet large enough to retain details. They are based on all of the available material up to January, 1912, and bear evidence of a degree of scientific worth hitherto unattained in this field.

The scale of all three maps is the same, viz., 1:40,000,000. The maps of the Pacific and Indian Oceans are drawn on Lambert's equal-area azimuthal projection, the map of the Atlantic on Lambert's equal-area cylindrical projection.

The limits of each map are ingeniously chosen. The Atlantic is shown in its entire extent, as defined by Krümmel, from the coast of West Antarctica beyond and including the Arctic Mediterranean to Bering Strait, and, on the east and west, including the European and the American Mediterranean. The map of the Indian Ocean includes, in the north, the Red Sea and the Persian Gulf, in the south, the whole of the Antarctic Continent and, in the east, the basin and trough region to the east of Australia and in the Malay Archipelago. The map of the Pacific Ocean on its eastern margin represents the beginning of the Greater Antilles with the Porto Rico Trough and, on its western margin, the Sunda Trough to the south of Java, so that this map includes all the oceanic troughs of the world.

The color scheme produces a plastic effect. The continental shelf, in pale yellow, and the troughs, in three shades of red, are admirably brought out; the intervening depths for every thousand meters are represented in six shades of blue. The line element is drawn with the greatest delicacy; in this it is in keeping with the great care and accuracy which pervades the whole undertaking. A text of 91 pages accompanies the maps. It affords an insight into the development of the work from the formulation of the problem through the selection of suitable projections and the preparation of intermediate maps, with their great amount of data of unequal value, to the final drawing. To his own draftsmanship the author applies the same strict control. Thus an estimate of the value of the work is possible in every respect, a circumstance which deserves special commendation.

The distribution of existing soundings, as is evident from the figures entered on the maps, is very unequal. They are, of course, densest in the North Atlantic. Except for the center of the Polar Basin there is hardly a five-degree "square" which does not contain at least one sounding, while in the South Atlantic there are many such, even in juxtaposition. In the latter, mainly south of the Tropic of Capricorn, the few definite routes stand out along which soundings have been made. In the mid-latitudes of the North Atlantic, however, there is only one region where there is a prominent gap, viz., in the area extending north to Davis Strait from the latitude of the Strait of Belle Isle. This would be a fruitful field for Canadian oceanography. In the Pacific there is a marked contrast between the now so well charted marginal areas of Australasia and the vast main body of the ocean, which, aside from a strip extending diagonally across it from Fiji to San Francisco, is conspicuously blank over wide expanses. In the Indian Ocean, also, except for its borders, the sounding routes still stand out too prominently, and between Tasmania and Kerguelen there is a zone totally devoid of soundings.

LUDWIG MECKING.

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* Translated from the original written in German for the *Review*.

[1] M. Groll: Tiefenkarte der Ozeane. 3 maps with 91 pp. of text. *Veröffentl. des Inst. für Meereskunde, Neue Folge, A: Geogr.-naturwiss. Reihe*, Heft 2. Berlin, 1912.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Annual Report of the Society. The annual meeting was held at the Engineering Societies' Hall, No. 29 West Thirty-ninth Street, on Tuesday evening, January 25, 1916, at 8:30 o'clock, President Greenough in the chair. The following persons recommended by the Council were elected Fellows:

Harry Calvin Berger	George E. Dadmun
Robert M. Bleakie	Timothy J. Daly
Edward Andem Bryant	Harold W. Dana
F. Garcia Calderon	Edward J. Davis
Paul Chalfin	Robert C. Davis
Edward Ball Cole	J. Randall Dean
William H. Coolidge	Nevin M. Fenneman
Clayton Sedgwick Cooper	Armin K. Lobeck
Alexander M. Crane	Thomas D. Murphy
C. T. Crocker	Andrew H. Palmer
Douglas Crocker	C. J. Posey
Elliott C. Cutler	Mrs. A. D. Rawson

Report of the Council

The annual report of the Council, approved at the January meeting, was read as follows:

To the Fellows of the American Geographical Society:

In a review by the Council of the affairs of the Society for the past year the first thought is necessarily of the European War. Whatever may be the individual sympathies or leaning of any observer of the gigantic contest, he cannot fail to welcome all the information which may help in understanding the people and countries involved, or in following the military movements reported by the press. Accordingly the Society has so directed its publications, lectures, and exhibitions that they might assist its members and the public toward this desirable end; and it has been gratified at the interest displayed by a large contingent who have availed themselves of these facilities. The relations of the Society with its correspondents throughout the disturbed area of Europe have been maintained with less interruption than might have been expected, and its monthly journal presents a well-rounded chronicle of kindred associations and events.

An important and progressive change has been made in the title and scope of the Society's *Bulletin*, which will henceforth be known as *The Geographical Review*, a designation which describes more accurately its plan and contents. The January number, already issued, presents an account and an example of the publication as proposed. It is hoped that the *Review* may bring the Society in still closer touch with its members and the scientific readers whom it aims to reach, by offering an increased contribution of material maintained at the highest possible standard of scientific and literary interest. During the twelve months of 1914 there were published in the *Bulletin* forty-seven original papers by eminent authors, besides notes of geographical interest, book reviews, map notices, and bibliographical lists and indices of most comprehensive character.

The number of Fellows at the close of the year was 1,151, of whom 362 are Life Fellows, an increase of 24.

There have been added to the library and map room during the year 1,171 books, 4,960 issues of periodicals and pamphlets, 68 atlases, and 2,647 sheet maps. Important progress has been made in binding a large number of unbound publications in the library, and steps have been taken to complete the binding of all the Society's unbound collection.

Twelve meetings of the Society were held at which addresses were made by the following speakers: William Elliot Griffis, Will S. Monroe, Edgar James Banks, B. R. Baumgardt, Glen Arnold Grove, Harry Clarke Ostrander, Herbert Lawrence Bridgman, Wilfred Harvey Schoff, Henry R. Rose, and Margaret Chapman Bolles.

The Charles P. Daly gold medal of the Society was awarded to Professor Paul Vidal de la Blache and was presented to him in Paris by the American Ambassador.

The customary joint annual meeting with the Association of American Geographers was held at the Society's building on April 9 and 10. The gathering was in every way a success, showing a largely increased attendance and an improvement in the number and character of the papers presented.

Reference is made to the accompanying report of the Treasurer regarding the current revenues and expenditures during the year. The invested funds of the Society have been increased by a legacy of $10,000 received from the executors of the late Herman C. Von Post, who was a constant friend of the Society during his life.

On July 1, Dr. Isaiah Bowman entered upon his duties as Director of the Society, and already his influence and abilities have made themselves felt.

The resources at the Society's building for study and reference are increasingly used by scholars and the public. The permanent value of timely exhibits of maps and photographs is indicated by the growth in the number of visitors to our exhibition rooms from 25,000 in 1914 to 32,800 in 1915. The number of students who have spent some time in serious study of geographical books at the Society's house has increased in the same period from 92 to 145 and the number of map consultants from 65 to 170. Nearly half of these consultants are professional geographers from colleges and universities, teachers of geography in the public schools, publishers, editors, journalists, and men of affairs. Through them we reach thousands who cannot themselves make direct use of our collections.

The staff continues zealous and efficient, and in general the condition of affairs and of the work gives cause for satisfaction.

Respectfully submitted on behalf of the Council.

John Greenough
Chairman

Report of the Treasurer for 1915

The report of the Treasurer, Mr. Henry Parish, Jr., was read:

On January 1, 1915, there was on hand in general account, a balance of (of which $375 was capital awaiting investment.)			$1,032.43
During the year there have been received from fellowship dues, sales of publications, interest on investments, and donations applied to general purposes		$42,283.40	
Donations for other and special purposes	$6,263.50		
Brought forward from 1914	4,939.23	11,202.73	53,486.13
Legacy			10,000.00
			$64,518.56
There have been expended for salaries, meetings, purchase of books and maps, library, publications, house expenses, insurance, postage	$46,096.00		
For special purposes, Memorial Volume, etc.	4,420.54	50,516.54	
Investment of legacy and capital above		10,375.00	60,891.54
Cash in general account		$1,257.43	
Unexpended donations		2,369.59	$3,627.02

The reports of the Council and the Treasurer were approved and ordered on file.

Report of the Special Committee

The Report of the Special Committee charged with the duty of selecting candidates for the offices to be filled was presented and read:

New York, January 25, 1916.

The Special Committee appointed December 16, 1915, to nominate and invite suitable persons to fill vacancies in the offices of the Society existing at the date of its annual

meeting in January, 1916, respectfully report that they recommend the election of the following gentlemen to the offices designated:

		TERM TO EXPIRE IN
President	John Greenough	1917
Vice-Presidents	Paul Tuckerman	1917
	James B. Ford	1919
Recording Secretary	Hamilton Fish Kean	1919
Treasurer	Henry Parish, Jr.	1917
Councilors	Frank Bailey	1919
	French E. Chadwick	
	Levi Holbrook	
	Archer M. Huntington	
	Charles A. Peabody	

Hamilton Fish Kean
Archibald D. Russell } *Committee*
Paul Tuckerman

The vote of the Society was unanimously in favor of the persons recommended by the Council and they were declared duly elected.

President Greenough then introduced the speaker of the evening, Mr. Samuel Alden Perrine, who addressed the Society on "India."

At an extra inter-monthly meeting on February 8 Mr. James Barnes of New York addressed the Society on a trip across Africa. The lecture was illustrated by excellent motion pictures of animal and native life, taken by Mr. Cherrie Kearton. The trip led from Mombasa on the Indian Ocean across British East Africa, with a side excursion to the Guaso Nyiro, and down the Aruwimi and Congo Rivers to the Atlantic.

Award of the David Livingstone Centenary Medal. The Council at its regular monthly meeting on January 20 awarded the David Livingstone Centenary Medal in gold to Sir Douglas Mawson in recognition of his discoveries and explorations in Antarctica in 1911-14. It will be recalled that this medal was founded in 1913 by the Hispanic Society of America upon the occasion of the one-hundredth anniversary of the birth of David Livingstone. It is awarded by the American Geographical Society "for scientific achievement in the field of geography of the southern hemisphere." Sir Douglas Mawson is the first recipient of the medal. His explorations are of special interest to Americans in that they have confirmed the discoveries of Captain Charles Wilkes in 1840, who established the existence of land—since generally known as Wilkes Land—along the Antarctic Circle south of Australia and from it correctly inferred the existence of a continental land mass in the south polar region. During the winter of 1914-15 Sir Douglas lectured before the Society, giving one of the most fascinating accounts of polar exploration ever heard in New York.

NORTH AMERICA

Alaskan Forests. Neglected Alaska is coming into its own. We are beginning to appreciate its many resources—not the least of them its forests (The Forests of Alaska, by Henry S. Graves, *Amer. Forestry*, Vol. 22, Jan., 1916, pp. 24-37). Fortunately the greater part of the most valuable forest, that of the Pacific Coast zone, is under government control, in the form of two national forests. In the southeast the Tongass National Forest occupies about 15,000,000 acres; centering about Prince William Sound the Chugach National Forest accounts for another 5,368,044 acres. From much of the intervening ground the forest is excluded by ice or by the extremely rugged topography. The coast forest is a continuation of that of British Columbia, Washington, and Oregon, modified, of course, by the effects of increasing latitude, but with its heavy rainfall and equable climate still distinguished by large stands of good quality timber. The trees are smaller, and some species, the Douglas fir, for instance, have dropped out. Red and yellow cedar appear in the Tongass Forest, but throughout the entire belt Sitka spruce and western hemlock are the predominating species. Shorter growing season, less rainfall, and considerable accumulation of muskeg are less favorable to forest growth in the Chugach region, especially in the northwest, where the coast forest passes into the interior type. The interior forest may be regarded as an extension of the great spruce forest of northern Canada. Its chief species are the white spruce, white birch, and cottonwood. Slow and stunted growth and limited distribution preclude it from ever realizing an outside market, but its local value, especially in these

days of early settlement, is very considerable. Unhappily, careless use and forest fires have already wasted much. It is estimated that 1,000,000 acres have been lost annually from the latter cause during the past twenty years. Ten years ago quantities of timber had to be imported into the Yukon mining camps from Puget Sound. On the coast, too, timber is still imported, but this will not be permanent. At present the high cost of labor and the abnormally low price of southern lumber enable the Washington mills to compete successfully. The Tongass forests must develop in time. Besides their value in timber content, they are easily accessible—the shore line has an extent of 12,000 miles—and there is abundant water power for running saw or pulp mills. Under proper management they can be made to yield not less than 500 to 600 million feet of timber per annum. Under public ownership they are open to development and even now supply a variety of local requirements, such as docks, mines, canneries, agricultural settlements.

Potash Resources of the United States. The war has enveloped the future of the potash industry in a cloud of speculation. One fact, however, has been clearly proved—that the United States possesses raw material in sufficient quantity to much more than supply its own requirements and that no insuperable physical obstacle prevents production of the commercial product. The commercial practicability of production is, however, another matter, and it remains unsettled (Possible Sources of Potash in America, by Frank K. Cameron, *Journ. of the Franklin Inst.*, Vol. 180, 1915, No. 6, pp. 641-651). The country has four possible sources of potash. Large deposits of potash feldspars occurring in various localities are known to contain 10 per cent or more potash, but it has not yet been proved that the cost of extracting the raw material or of refining the product is not prohibitive. The widely distributed potassium salts of desert basins are in general too little concentrated for practical working. There is one known possible exception. A "miner's chance" is in the process of exploitation at Searle's Lake, San Bernardino County, California. Below the mud surface of the "lake" is a layer of brine with potassium chloride yielding 5 to 6 per cent potash. Ordinary crystallization methods have failed to obtain a sufficiently pure product from the mixture of soluble salts, but the company now engaged in the exploitation is working on new methods of separation. Other difficulties lie in the way of utilizing the alunite deposits of southern Utah—transportation problems and lack of local markets for the by-products that decide the balance between profit and loss. At the present moment two companies are in operation and may succeed on a small scale. The most hopeful prospect rests with the giant kelps of the Pacific Coast. The sun-dried alga contains 16 per cent potash and is an excellent fertilizer. The plant can be harvested on a vast scale, far exceeding any home requirements, but the technology of the drying process has not yet been worked out in a practical way. Another deterrent is also likely to arise. The beds of algæ lie within the limits of the state, and no satisfactory legislation exists in regard to them.

Population Controls in Montana. White settlement in Montana was first controlled by the waterways. Following the Lewis and Clarke expedition fur trading posts were established on the Missouri and Yellowstone Rivers, whence furs went out and supplies came in from St. Louis,—in the early days an upstream journey of six months. With the coming of the steamboat in 1829 river traffic expanded rapidly, reaching a maximum after the discovery of gold, 1861-1862, and before the arrival of the railroad, 1883. The first control of the more permanent settlement was the mineral wealth of the mountains. In 1870 about 75 per cent of the population was living in four mining counties occupying less than 9 per cent of the total area of the state. Conclusion of the Indian wars in the later seventies opened up the eastern plains to cattle ranchers and sheep men, whose occupation was largely determined by the limited water supply. Profound changes of distribution commenced with the new century and the discovery of the dry-farming possibilities of the bench lands of the east. Today the value of Montana's agricultural products exceeds that of her minerals. Railroads that formerly served only the mining districts are now seeking the most favorable agricultural locations. A rise of the newest control—manufacturing—is seen in the increasing city population. According to the 1910 census six cities had a population of over 10,000. (Geographic Influences Affecting Distribution of Population and Character of Industries in Montana by O. A. Freeman, *Inter-Mountain Educator*, Jan., 1916.)

Glaciation of the San Juan Mountains, Colorado. For some years Professor W. W. Atwood of Harvard University has been studying the San Juan Mountains region in southwestern Colorado. He now presents (Eocene Glacial Deposits in Southwestern Colorado, *U. S. Geol. Surv. Prof. Paper 95-B*, pp. 13-26) some conclusions of importance concerning the physical geography of the region in relation to early Tertiary glacial

deposits discovered in the foothill belt at the northwest base of the massif. In the discussion of the origin of glacial deposits there is published the following diagrammatic cross-section which summarizes the physical history. It is concluded that during the dissection of the early San Juan Mountains (the uppermost of the three shown in the diagram) ice formed in the higher valleys and descended to bordering lowlands. After the disappearance of the early Tertiary ice a peneplain was developed, bordered on the

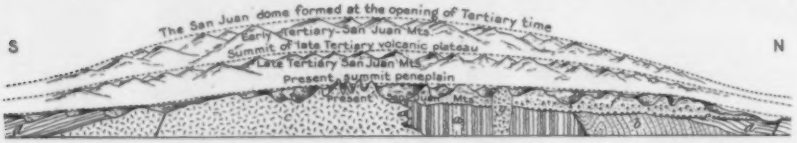

FIG. 1—Diagrammatic cross section showing the physiographic evolution of the San Juan region since the beginning of Tertiary time. *a*, Pre-Cambrian schist and gneiss; *b*, Algonkian quartzites; *c*, Pre-Cambrian granitic intrusion; *d*, Paleozoic and Mesozoic rocks; *e*, Ridgway till and Telluride conglomerate; *f*, middle and late Tertiary volcanics; *g*, Tertiary intrusives.

Reproduced from Fig. 11, *U. S. Geol. Surv. Prof. Paper 95-B.*

west by mountains. Both mountains and peneplain were affected on the one hand by erosion and on the other by vulcanism, the latter producing a great volcanic plateau. Further dissection followed the warping and doming of the summit peneplain and produced, with glacial agents, the present San Juan Mountains. It is further concluded that continuing uplift stimulated valley erosion and resulted in the cutting of the present deep canyons below the level of the broad glacial troughs.

Irrigation and Rice Cultivation in Texas. A few years ago Texas was the foremost rice-producing state of the Union. This was the boom period that followed the introduction of improved cultivation methods in 1895. Ravages of the boll weevil in the cotton fields helped to turn attention towards rice-growing, and the plentiful supply of good cheap land encouraged extensive cultivation. From the Louisiana boundary to the River Guadalupe the black clayey soil of the coastal plain is eminently suited to rice-growing: but profit from rice as a frontier crop could not be of long duration. Impoverishment of the rich soil, scarcity and high cost of labor, with other economic restrictions, necessitated the adoption of intensive methods. The problem of successful rice production has essentially resolved itself into the problem of scientific irrigation (C. G. Haskell: Irrigation of Rice on the Coastal Prairies of Texas, *Texas Dept. of Agriculture Bull. No. 43*, pp. 88-116). In many respects the Texan rice zone is well adapted to irrigation. The surface of the land is level and the subsoil impervious. The considerable rainfall (averaging 46 inches per annum, with 60 per cent in the growing season), the large amount of water surface, and the height of the water table provide or conserve a very fair water supply. Moreover the length of the growing season—273 days—permits an extended period of planting and hence a more equitable use of the water. Well construction is practicable throughout much of the region. Near the Gulf, water-bearing layers are struck at little depth. Deep wells, indeed, cannot be employed in the coastal fringe, for they tap salt water, which, even in small amounts, is harmful to the young plant. A similar disadvantage may be encountered in stream irrigation near the shore, when a low stage of the river water causes inflow from the sea. Altogether wells supply about 17 per cent of the irrigation water, a smaller proportion than during the early days of more isolated settlements. The well source is advantageous in times of adequate and uniformly distributed rainfall, otherwise canal irrigation is more economical. Irrigation of this latter type affords great scope for development along co-operative lines. Economies can be effected by the use of common arteries and pumping apparatus. Cheap and efficient running of the latter is particularly desirable. One of the factors determinant of cost is the accessibility to fuel resources. In the vicinity of the oil-fields a cheap fuel is available. Smaller and more isolated plants are frequently able to use wood from the forested borders of the prairie lands. The question of water control is one of the most interesting. About one-third of the water used is controlled by the users; a greater proportion is obtained by cash rental and the rest by payment in kind—either a certain share, usually one-fifth, or a fixed amount of the crop. In a few cases the farmer is a *métayer* paying a share of the crop for land, water, and seed. Distribution of the rented water is regulated by levee riders on whose honesty and discretion depends much of the smooth and effectual working of the system. Occasionally echoes may be heard of the dissensions that are as old as

the beginnings of irrigation, dissensions that vexed the earliest irrigators in Babylonia and today still perpetuate constant discord along the 1,600-mile stretch of coast that forms the western desert of South America.

Mexican Land Grants in California. The history of old Spanish grants in United States territory has always been replete with judicial uncertainties. An account of grants bestowed by Mexico in California is given by C. C. Baker in the 1914 issue of the *Annual Publications of the Historical Society of Southern California* (Vol. 9, Part 3, pp. 236-243). From this it is gathered that although the American government did not intend to annul the grants of land made by Mexico, a study of the United States patents covering the old grants reveals occasional imperfections in the titles to land properties.

Altogether seventy-eight patents were issued, covering an area of 1,419,475 acres. Some were of considerable dimensions. The San Fernando Mission estate comprised 116,858 acres of land. The Simi grant followed with 113,009 acres. Nine patents covered 40,000 acres each. The names of some of these grants are perpetuated in the towns. San Pedro is an instance in point. The beach cities of Santa Monica and Redondo are others. It is interesting to note that the missions retained but little of the vast tracts they once claimed. Such parceling of property has steadily taken place since the beginning of American sovereignty over the region.

The War and Cuban Commerce. While eastern Cuba is enjoying a period of prosperity, the western part of the island is plunged into such serious financial distress that congress has been compelled to vote a considerable sum for relief amongst the working people and has offered free railway transportation to conduct labor from west to east (The Cuban Tobacco Industry, *South Amer. Journ.*, Vol. 79, No. 23, Dec. 4, 1915). Eastern Cuba produces sugar. The diminution in supply of the European product has enabled her to dispose of the excellent 1914-15 crop at highly remunerative prices. On the tobacco industry of the western section of Cuba the war has had a contrary effect. Increased taxation on the import of this commodity into the United Kingdom has reduced the demand from Cuba's second largest customer. More recently the British prohibitions on imports—including tobacco—which became effective March 1, have produced the gravest apprehension among the tobacco producers of the West Indies, especially Cuba.

SOUTH AMERICA

Economic Regions of South America. A recent publication of the Bureau of Foreign and Domestic Commerce of the Department of Commerce entitled "Banking Opportunities in South America" by William H. Lough (*Special Agent Series, No. 106*), though devoted primarily to banking problems, contains some facts of interest to geographers. The author, by way of introduction to his report, proceeds to show that, economically, South America may be divided into four rather distinct regions. The first is the Amazon basin, comprising most of northern Brazil and the eastern lowlands of Peru and Bolivia—the regions of tropical forests. Next to rubber, sugar and cacao are the main products. The second region includes the River Plate basin, southern Brazil, and northern Argentina. This region he designates "the fertile, prosperous, and partly developed agricultural section of South America." The northern portion of this division contains the great coffee-producing section of Brazil, while the River Plate valley is one of the great sources of supply of live stock and grain. A third region embraces the west coast, comprising Chile, western Bolivia, Peru, and Ecuador. Minerals, notably copper, tin, and nitrates, are the chief products, although there are fertile sections (not along the coast) whence are obtained grain, cattle, and fruit in the southern part of the region, and cotton, sugar, and cacao in the warmer northern sections. The fourth region comprises the north coast—Colombia and Venezuela, producing coffee, sugar, cacao, tobacco, and tropical fruits, and containing, in the interior mountainous section, important mineral resources. If a fifth region were to be marked off, he would make it by subtracting from the second region its northern portion—the great coffee-producing section of Brazil. "Each one of these four regions," says Mr. Lough, "has an economic life of its own. Their products, their shipping routes and trade connections, and their populations are quite distinct. It is probably safe to say that each of the four regions has much closer relations with the United States and Europe than with any of the other three regions."

AVARD L. BISHOP.

The Economic Development of São Paulo. Nearly a decade ago, in an endeavor to remedy the results of the overproduction of its staple the state of São Paulo undertook an extraordinary fiscal experiment,—the valorization of coffee (*cf.* "Brazil's Failure

to Control the Price of Coffee," *Bull. Amer. Geogr. Soc.*, Vol. 41, 1909, pp. 220-222). The loans contracted for that purpose in 1907 have now been amortized, but it is anticipated that the supertax of 5 cents per sack on exported coffee levied for the purpose will be continued (*Suppl. to Commerce Repts.*, No. 40d, Nov. 16, 1915). Coffee still forms 99 per cent of the foreign exports of the state, and it is estimated that the supertax will contribute over half the total revenue. This progressive state is continuing its policy of encouragement of diversified production. The needs of a growing population and the influence of the state department of agriculture have increased the area planted to crops, especially corn. Wheat, however, has not yet proved a success. A notable advance has also been made in the meat-packing business.

Rubber in Argentina. A variety of the rubber plant occurring in the department of Orán in northern Argentina is described by C. Spegazzini in the July-August, 1914, issue of the *Anales de la Sociedad Científica Argentina*. It is locally known as *verdenasco* or *zarzaparrilla blanca silvestre*. Its botanical name is *Smilax campestris Grisb.*

The rubber yielded by this plant differs from the familiar product by a greater degree of solubility in ethyl alcohol. It is described as amorphous, inodorous, without marked taste, and highly elastic. It is insoluble in and impermeable to water. On the other hand, it melts readily in solutions of carbonic sulphide, benzine, or chloroform. The product is characterized by rapid vulcanization in the presence of a sulphurous solution. When burned it emits the characteristic odor of rubber.

EUROPE

Northern Outlets of the Mediterranean Basin as Historical Factors. An enlightening contribution to the history of the Mediterranean basin is presented by Miss Semple's studies of its northern breaches in the *Annals of the Association of American Geographers* (Vol. 5, 1915, pp. 27-59). The favored lands surrounding this sea were cut off from the rest of the world during prehistoric ages by mountain or desert barriers. Their early inhabitants were left to themselves. Eventually contact with northern foreigners was brought about through the existence of four important breaches in the northern rampart of uplifts. From east to west Miss Semple designates them as the Bosporus-Hellespont breach, the Morava-Vardar furrow, the passes of the Julian Alps and the Karst, and finally the Rhone Valley breach. They are the main avenues of intercourse between northern and southern Europe. Migrations, trade, or military expeditions have flowed through these channels.

The importance of Miss Semple's researches is illustrated in the case of the Rhone basin gap. Lying between the pile of primary rocks of the Massif Central and the Tertiary folds of the Alps, it forms, together with the valley of the Saône, a corridor which links the Mediterranean to the ancient land of Burgundy. The breach branches out here, fork-like, into the valley of the Seine and, through the Belfort gap, into that of the Rhine. Thus it became the avenue through which blond northerners passed among southern brunettes. At the time of Roman world-colonization its low-lying territory allowed the civilization of Rome to penetrate into Gaul. Through the Mediterranean at its southern end and the Seine emptying into the Channel at its northern extremity it conveyed Mediterranean culture into the very heart of England.

In the same way the function of the remaining three breaches has been that of bringing north and south together. Through the Bosporus-Hellespont gap the life of Russia's southwestern plains was drawn, albeit imperfectly, into Mediterranean activity, while countercurrents of southern thought traveled slowly northward. The penetrability of orographic barriers to civilization is made clear by such detailed description. It is to be hoped that a study of the southern breaches from the same pen may soon be available.

AFRICA

Condition of the "Cape-to-Cairo" Route. The route of the "Cape-to-Cairo" transportation system has been surveyed in its entirety and is actually short of completion by only three comparatively short links (*Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 64a). On the two unconstructed railroad links, both in the Congo, work has been suspended since the outbreak of the war. One of 155 miles from Tshilongo to Bukama is required to put the latter place in rail communication with Cape Town, distant 2,620 miles. From Bukama, river navigation, with two short railroad sections avoiding the rapids between Kongolo and Kindu and between Ponthierville and Stanleyville rapids, extends to Stanleyville and the beginning of the second unbuilt section of about 548 miles to Mahagi on the western shore of Albert Nyanza. From thence Uganda Government steamers will be operated to Khartum, in which section the only hindrance to navigation is the rapids between Rejaf and Dufile. This will be removed by the

construction of a lock instead of by the railroad line at first proposed. From Khartum Sudan Government trains and steamers and the Egyptian Railway complete the route to Cairo and Alexandria. The transcontinental route across tropical Africa from east to west was opened during the early part of 1915 (see *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 449-450 and p. 959) but is now closed on account of military necessities.

Effect of the War on South African Trade. According to Laite's Commercial Blue Book for South Africa, 1915 (pp. 181 and 321), the war has had a remarkable effect on the reduction of exports. The reduction in value of exports for the first seven months of the war amounted to $102,500,000. This was largely due to the fact that it was not deemed safe to ship raw gold, diamonds, and wool, though the inconvenience, as far as gold was concerned, was nullified by an arrangement with the Bank of England, which negotiated bills on the same basis as though gold had been shipped. Another element in the reduced exports was the complete collapse in the demand for ostrich feathers, a trade that was weakening before the war and was paralyzed when hostilities began. Thus South Africa stands out with greater prominence than ever as a distinct economic unit, in many respects unlike the temperate regions of South America or Australia. Their exports are still in demand, for they belong almost exclusively to the class of necessities for Europeans. (See also the articles by A. L. Bishop and Mark Jefferson on the effect of the war on world and on American trade in the *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 641-651, and the article in this number on "Trade Movements and the War.")

ASIA

Land Routes to India. As a consequence of the campaign being carried on in Mesopotamia, the possibility of a Turco-German drive to India is suggested by Talcott Williams under the caption "Can Germany go to India?" in the January number of the *Review of Reviews*. The writer takes into account the several routes to India and points to the main caravan route through Persia and Baluchistan as a likely path for an invading force. For this he has assumed that the Bagdad line is completed and, this being insufficient, he further assumes that the building of branch lines to Sulemanieh and Hanikin are being pushed vigorously.

Perhaps the writer is over sanguine in his estimation of the rapidity with which these Turkish railroads can be built. His reproduction of our Society's map of Turkish railroads published in the December issue of the *Bulletin* shows the Bagdad line in operation, although the original merely indicated that it was under construction. Mr. Williams' assumption is based on news conveyed to him by a nameless wanderer from Mosul. Nevertheless, he would have been much nearer the truth had he chosen to abide by the Society's carefully prepared map, which was brought up to date of December 1, 1915, and not merely to August 1, 1914, as he has stated. A casual reference to the Gaza line, shown completed to the Egyptian border, would have indicated this.

But supposing the line to be completed, although it is doubtful whether 1916 will witness the event, the transportation of a German or Turkish army to India over it makes better reading than practical working. Thirteen hundred miles of some of the most sterile land in the world separate Mesopotamia from India. Far from being a causeway between these two fluviatile regions, the plateau of Iran would probably be the grave of an expeditionary force marching eastwards. Its central caravan route is merely a narrow strip in which fresh water is occasionally met, though not in the quantities required by a modern force on the march. It may be negotiated satisfactorily, yet ever arduously, by a string of thirty-odd camels and their attendants. But to send an army over this route is another undertaking. The real danger to India, if any, lies in native uprising rather than in land attack by German or Turkish forces.

Opening of Pukow Harbor. Pukow, a Chinese seaport on the north bank of the Yangtze River, directly across from the city of Nanking and 205 miles from Shanghai, has been opened to foreign residence and trade by the Chinese Government, according to information from Consul J. Paul Jameson in *Commerce Reports* for January 17, 1916. The port lies in the province of Kiangsu and consists of the three small islets of Yung Seng Chow, Chin Foo Chow, and Liu Chow. It has the advantage of being accessible at all times of the year and may on this account prove to be a serious rival of Hankow's traffic.

A large amount of freight is expected to reach Pukow through the Tientsin-Pukow railway, which traverses the fertile agricultural districts of Anhui and southern Kiangsu, the mining and farming districts of northern Kiangsu and Shantung, and the cotton-raising districts of Shantung and Chihli provinces. The productive northwest region of China is also tapped by the line through its connection with the Peking-Hankow railroad.

Irrigation Societies in the Philippines. An interesting condition of primitive societies and one illustrating the similarity of human institutions in widely separated regions is exemplified by the organization of irrigators in some of the Philippine provinces, as described in a recent paper by Emerson B. Christie (Notes on Irrigation and Co-operative Irrigation in Ilocos Norte, *Philippine Journ. of Sci.: Section D*, Vol. 9, 1914, No. 2, pp. 99-113). Here are considerable areas of land under irrigation, mainly devoted to the growing of rice. The works, though effective, are crudely constructed, being the result of efforts continued through generations. Water is diverted from the streams usually by low temporary dams of bamboo and rock. The ditches as a rule are well constructed and show good maintenance. Water is conducted by gravity, few, if any, mechanical devices being in use. The people who built and operated these works can rarely read and write, but they have developed forms of organizations which are quite complicated and, at the same time, effective. The agreements recite certain definite understandings and are drawn up and signed by each individual water user, usually by a cross.

The interesting point is that these agreements among semi-civilized people are similar to those which have existed for several generations in the southwestern part of the United States among the town-dwelling Indians and the neighboring Mexicans who have settled along the Rio Grande and its tributaries, and other similarly situated rivers. The documents recite the conditions which are to be fulfilled and the penalties for evasion of duty by any one of the members of the community. A chief is chosen each year by popular vote, and his orders with respect to the operation and maintenance of the irrigation system are to be obeyed. Each person is to appear for work at the designated time or he will be fined for failure to perform his part. The penalties, while not extreme, are adequate to insure fairness and bring about a proper sharing of the difficulties as well as of the advantages. The existence of such understandings in widely separated parts of the world and the fact that they have been in force from time immemorial demonstrates the practicability of effective community work among these people of similar education and experience. It is also interesting to note that, as in more highly developed societies, there are ever-present dangers of one man of unusual energy or ability dominating in the division of benefits. Provisions are made to meet these conditions; for example, the elected chief is forbidden to enter into contracts without first submitting the proposition to a meeting of the society. Another provision forbids a member alienating his share without the consent of his fellow-members. In these societies as elsewhere the chief difficulty arises in the protection of the rights of the weaker members and in the fair distribution of the water to all entitled to it. The favored safeguard seems to be in the annual choice of a chief and in the provisions which in effect require a full publicity as to all actions taken.

F. H. NEWELL.

AUSTRALASIA AND OCEANIA

Physiognomy of Western Australia. A great part of the state of Western Australia, comprising an area equal to that of the United States east of the Mississippi River, is a characteristically arid land. Its general surface is a vast, even, slightly tilted, and recently uplifted plain, the high points of which are 4,000 feet above sea-level. A quite notable feature of this desert tableland is the remnant of an old peneplain which still persists, even near the sea, where the climate is rather moist. In the interior the old peneplained surface seems to have been all but completely obliterated by the work of the new cycle of erosion. According to the conclusions recently drawn by Mr. J. T. Jutson (An Outline of the Physiographical Geology of Western Australia, *W. Austr. Geol. Surv. Bull. 61*, Perth, 1914), after an exhaustive study of this country, the present relief expression of the region is mainly, if not solely due to wind erosion, and a new plains-level is at the present time being developed at an angle to the old one.

It thus appears that the arid great plateau of Western Australia, like the high plains of the South African veldt and the Mexican tableland, is a vast area wherein regional leveling and lowering is now going on without any near approach to baseleveling. Nowhere else on the face of the globe are the relative efficiencies of the different erosional processes displayed in so remarkable a manner so near together as in Western Australia. Marine planation, stream corrosion, and general wind-scour are vigorously at work upon the destruction of the old tilted peneplain. Their potencies appear to be inverse to the order mentioned.

CHARLES R. KEYES.

The Latest Eruption of Mauna Loa. Further notes on the outbreak of Mauna Loa from November, 1914, to January, 1915, are given by Dr. T. A. Jaggar, Jr., in the *American Journal of Science* (Vol. 40, No. 240, Dec., 1915, pp. 621-640). The events of the period of seismic prelude as well as the observations taken during the outbreak

are recorded. The activity of the volcano is considered a preliminary summit ebullition of the same type as that which preceded former eruptions. The case of the great Hilo flow of 1880-81, which came as a sequel to the eruptive period of May, 1880, is cited together with other occurrences of approximately similar periodicity.

The relation of this volcano to Kilauea still awaits determination. It has been observed in general that the subsidence of Kilauea lava to smoky depths corresponds to a paroxysmal period at Mauna Loa. A complicated system of interdependence between the two volcanoes may possibly manifest itself by alternations of eruption. The rise of Kilauea corresponding to the Mauna Loa outbreak may be interpreted by this assumption. The possible existence of a subterranean connection is found in the occurrence of gas-impelled fountains of lava foam detected before the rise of the lava column from the Mauna Loa vent 10,000 feet above the level of the mouth of Kilauea.

No manifestations of activity after the eruption were noted from January to June, 1915. After the summer solstice, however, thin smoke was detected occasionally. A slight rise of Kilauea lava was also observed in June. It is not to be expected that lava will flow from the flanks of the volcano for some years.

PHYSICAL GEOGRAPHY

Sunspots and Atmospheric Pressure. Von Hann, Blanford, and Fritz have discussed the effect of sunspots on atmospheric pressure, with generally rather unsatisfactory results. So far as India is concerned, Blanford did present some fairly good evidence tending to show that at times of sunspot maxima the pressure in the Indo-Malayan region is high, while that in European Russia and western Siberia is low. Dr. Gilbert T. Walker, Director-General of Indian Observatories, discusses sunspots and pressure in his sixth paper on "Correlation in Seasonal Variations of Weather" (*Mem. Indian Meteorol. Dept.*, Vol. 21, Pt. 12, 1915). The data relate mostly to the years since 1850, and the correlation coefficients are charted. Comparison of this chart with the corresponding one, previously published by Doctor Walker, for sunspots and rainfall, shows the general tendency of the pressure coefficients to be of opposite sign to the rainfall coefficients. It is inferred that the variations of pressure and rainfall are to a large extent dominated by the same cause and are comparatively little affected by variations of temperature. Further, the relation between sunspots and temperature seems to be brought about rather by excess of humidity in the air, at any rate in its higher levels, than by excess of rain. Doctor Walker regards it as premature to discuss in detail the causes that are at work in the relation of sunspots and pressure until the data of certain other elements have been analyzed. Future publications dealing with Doctor Walker's further investigations of this highly important subject will be awaited with interest.

R. DEC. WARD.

HUMAN GEOGRAPHY

Geographic Influences in the Field of Science. In a presidential address delivered at the eleventh annual meeting of the Association of American Geographers and reproduced as the leading contribution to the fifth volume of the Association's *Annals*, Prof. A. P. Brigham has marshaled a host of facts which bring out the all-pervading nature of geography. His views may be summed up by stating that before looking into any form of activity we should look at the land in which it is manifested. Geography thus becomes the science of foundations. It is to be regarded as a parent-science rather than a sister-science.

Treating of geography and American character, Professor Brigham points to the necessity of taking ancestral environment into account. Thus the New Englander is, to a certain degree, the product of the surroundings in which his forebears moved prior to their emigration to America. The spirit of Jute or of Viking rovers enters today into the character of many a Vermont farmer or British Columbia rancher. The extent to which such prenatal influences prevail in the individual cannot be determined. But the past lives in the present, and this is the triumph of will over unthinking nature. The Puritan on the rocky northeastern coast of the United States did not succumb to environing inhospitality but brought long inherited energy into action upon his new American home.

The exploitation of the field of regional geography is strongly urged. This is the day of intensive studies. The United States' field is full of possibilities. The sowing of a healthy seed was begun four centuries ago, and the harvest season cannot be much delayed. Physiographic and historical material abounds for the eastern United States. The Coastal Plain, the Piedmont, or the Great Appalachian Valley, are topics suggested. The name of every state in the Union ought to be placed on the list. Our great river valleys, a unit like Long Island, likewise lend themselves admirably to this treatment.

The paper is notable for its breadth of scholarship, its closely organized form, and its sanity and suggestiveness. It would be a great gain for geography if there were general emulation of the author's charming literary style. The only criticism of the paper grows out of the too close adherence in the opening paragraphs to theories of evolution now superseded or at least strongly modified by the recent anthropological work of Ripley, Elliot Smith, and Osborn.

Weather and Human Health and Activity. More and more attention is being paid to the relations between the weather and man's mental and physical condition. The medical profession has long recognized the importance of this matter, but it is only in recent years that careful statistical inquiries have been made, by meteorologists and others. An investigation of this character has lately been carried out, with the assistance of the Vienna Academy of Sciences, by Drs. Wilhelm Schmidt and Ernst Brezina (*Sitzungsber. Wien. Akad. Wiss.: Math.-naturwiss. Kl.*, Vol. 123, Sect. III, 1914, pp. 209-291). The authors point out the need of caution in any such study,—the danger of basing conclusions on occasional correspondence of what seems like effect and cause, and the importance of realizing that variations of some perhaps neglected or even unknown control may be the real cause of the phenomena with which we are dealing. The material used in the present investigation was the work of certain employees in the Census Office and of fifty classes of school children, and the statistics of epileptic attacks in a certain institution—all of these in Vienna. These reasonably abundant and comparable data were all carefully collected and "accidental" conditions allowed for, so far as possible. The meteorological data, which were probably the most complete yet used in any such investigation, were obtained from the official records of the Vienna observatory.

The most important conclusions are as follows: No single meteorological element included in the investigation has a preponderating influence on man's health and activity. Moderate intellectual activity seems at its best when the pressure is constant. Short and rapid pressure changes (4-20 minutes) of considerable amplitude are associated with unfavorable conditions of intellectual work, and with epileptic attacks. Intellectual work is diminished by high temperatures (plus temperature departures lasting two or three days). The ozone content of the air seems to have practically no effects, and wind has only very slight effects. Clerks and school children do their poorest work under weather conditions which prevail when the pressure is falling locally and rising in the west. The opposite relation holds for epileptics. R. DEC. WARD.

GEOGRAPHICAL NEWS

Organization of the Ecological Society of America. A meeting was held at Columbus, Ohio, on December 28th, 1915, at which it was decided to organize the Ecological Society of America. Dr. Victor E. Shelford, of the University of Illinois, is president of the new society, and Professor W. M. Wheeler, of Harvard University, is vice-president. Steps had been taken a year before to secure the views of animal and plant ecologists with regard to the formation of such a society, and the result was the enrollment of one hundred charter members and the rapid acquisition of over one hundred additional members in the fortnight following the organization meeting. The society will hold an annual session for the reading of papers and will organize field meetings from time to time in different parts of the country. The first regular meeting will be held in New York during Convocation Week of the present year. Field meetings have already been arranged to take place in the vicinity of Chicago in June, and at San Diego in August. The interests and activities of this society will be of the broadest character, embracing every phase of the relation of organisms to their environmental conditions, including the study of animal and plant geography. Those who are desirous of becoming members of the Ecological Society should communicate with the secretary-treasurer, Dr. Forrest Shreve, Tucson, Arizona.

The Revue de Géographie Annuelle. Back numbers of this valuable publication have been recently added to the Society's library, and the entire set is now available for consultation. The last volume issued is the seventh in the series. It contains papers published in 1913. Some might more appropriately be called monographs than articles. Volume 7 in particular contains three long and instructive studies bearing the following titles: "Le Commonwealth d'Australie," "Les Dépressions Continentales et le Climat du Tonkin," and "La Basse Normandie." Volume 5 (1911) is of particular interest to American students because it contains a paper on the economic geography of Cuba. Volume 6 (1912) contains a French translation of Erland Nordenskiöld's detailed ethnographic study of the Indians of the Argentine and Bolivian Chaco (German edition listed in the September, 1915, *Bull. Amer. Geogr. Soc.*, p. 717).

Ten Years' Index to the Geographische Zeitschrift. This well-known Leipzig publication has just issued its "Register zu den Jahrgängen 1905-1914" prepared by Dr. Daniel Häberle. It is a systematic index, covering 160 pages, to the contents of the *Zeitschrift* for the ten years ending with Volume 20. Professor Franz Thorbecke prepared the index for the first ten years, and the two volumes make the entire content of this notable periodical easily available for all geographical workers.

Personal

Mr. Will C. Barnes, of the U. S. Forest Service, spoke on February 11 before the Geographic Society of Chicago on "The Life of a Forest Ranger."

Captain Joseph E. Bernier, according to press despatches from Quebec dated January 16, is planning another expedition to the Canadian Arctic. He proposes to start in July on his own ship, the *Guide*, and to be gone for two years. Captain Bernier will be remembered for his previous explorations in the American Arctic archipelago,—of interest geographically, because of the original surveys of the uncharted northwestern end of Baffin Island, and politically, because he was the officer who carried out the formal annexation by Canada of the whole archipelago.

Professor Franz Boas, of Columbia University, spoke on January 24 before the New York Academy of Sciences on "General Ethnological Notes from Porto Rico."

Mr. Anthony Fiala gave an illustrated lecture on January 14 before the Geographic Society of Chicago entitled "Through the Brazilian Jungles with Colonel Roosevelt." Mr. Fiala, it will be remembered, was a member of one of the three parties into which the Roosevelt-Rondon Expedition separated to reach the Amazon. His route followed the Papagaio, Juruena, and Tapajoz Rivers (see map in this number on page 171).

Captain Granville Fortescue lectured on February 2 before the Geographical Society of Philadelphia on "The Dardanelles and the European War."

Professor A. W. Grabau, of Columbia University, gave a paper on January 3 before the New York Academy of Sciences on "Some Parallelisms in the Geology of Western Europe and America."

Professor D. W. Johnson, of Columbia University, spoke on January 3 before the New York Academy of Sciences on "The Strategic Value of Landforms in the Great Russian Retreat." The lecture discussed substantially the same topics as Professor Johnson's paper in the February *Review*. On February 11 Professor Johnson addressed the members of the United State Naval War College at Newport, R. I., and, a week later, the students of Mount Holyoke College on "Topographic Features of Europe as a Factor in the War."

Dr. Frank E. Lutz, of the American Museum of Natural History, spoke on February 15 before the New York Entomological Society on "Centers of Dispersal and Their Bearing on the Present Distribution of Animals."

Mr. Norman Taylor, of the Brooklyn Botanic Garden, is giving a course on phytogeography at that institution. The course deals with plant distribution over the earth. Prerequisites are courses in plant ecology and geology and a good general knowledge of climatology and systematic botany.

Professor William I. Thomas, of the University of Chicago, spoke on January 28 before the Geographic Society of Chicago on "The Comparative Mental and Moral Worth of Races."

Mr. Eugene Van Cleef, of the Duluth (Minn.) State Normal School, spoke on "Our Debt to Climate" at a geography round table at a meeting of the Northeastern Minnesota Educational Association on February 18.

Dr. Lucy L. W. Wilson, of the Philadelphia Normal School, on January 19 gave an illustrated lecture before the Geographical Society of Philadelphia, entitled "Climate and Prehistoric Man as Revealed in Recent Excavations in New Mexico."

Obituary

Professor Eugene W. Hilgard died on January 8 at the age of 83. Since 1904 he had been emeritus professor of agriculture at the University of California. The breadth of treatment and attention to causal relationship resulting from Professor Hilgard's equal proficiency in geology and agriculture gave his work a distinctly geographic character. The fundamental "Report on Cotton Production in the United States," published in 1884 by the Tenth Census, was prepared under his direction; he himself contributed the general discussion of cotton production and the sections devoted to Louisiana and Mississippi, each preceded by a summary of the physical geography

of the state. From 1855 to 1873 he was state geologist of Mississippi; to this period belongs his "Report on the Geology and Agriculture of Mississippi," 1860. For thirty years, from 1874 to 1904, he occupied the chair of agriculture at the University of California. In 1881-83 he was in charge of the agricultural division of the Northern Transcontinental Survey along the Northern Pacific Railway; his observations were laid down in a "Report on the Agricultural Features of the Pacific Slope," 1882. His last work, "Soils: Their Formation, Properties, Composition, and Relation to Climate and Plant Growth in the Humid and Arid Regions," 1907, is a standard contribution to the subject in English.

VICTOR HUOT, the cartographer of the Paris Geographical Society, was killed in battle on April 28, 1915, at the age of 48. Prior to his connection with this society, he had contributed to all of the map publications of the firm of Hachette et Cie., notably the "Atlas Universel de Géographie" by Vivien de Saint Martin and Schrader. In addition to his regular compilations for *La Géographie*, the organ of the Paris society, he prepared a set of river-basin maps of the French Alps for the water and forest commission of the Service des Grandes Forces Hydrauliques and wrote the section on South America in the recent "Grande Géographie Bong" published under the direction of Onésime Reclus.

PIERRE LEROY-BEAULIEU was killed in action near Soissons on January 13, 1915, aged 44. A son of the famous French economist, he had mainly devoted himself to economic geography, occupying the chair of commercial geography and statistics at the École Libre des Sciences Politiques and the chair of political economy at the Collège de France. His "Les États-Unis au XXe Siècle," 1914, is one of the foremost foreign discussions of the economic geography of our country. In his "Les Nouvelles Sociétés Anglo-Saxonnes: Australie, Nouvelle Zélande, Afrique du Sud," 1901, he lays greater emphasis on political and social conditions.

SIR CLEMENTS ROBERT MARKHAM died in London on January 30, 1916. The little village of Stillingfleet, where he was born in 1830, records in its name the disembarkation there of the fleet of the Norseman Harold Hardrada. The historic incident suggests itself appropriately, for Sir Clements Markham's was a voyaging spirit akin to that of the ancient seamen. His travels, beginning at the early age of fourteen, extended from Arctic shores to African plateaus, Indian plantations, and Peruvian valleys. Happily all are recorded by his facile pen. To our geographical literature of the Arctic he contributed "Franklin's Footsteps," 1852, and "The Threshold of the Unknown Region," 1874, based on his early experience with the Franklin Search Expedition of 1850-51 and a later journey to Greenland with the Nares Expedition. Indirectly the cause of Polar exploration owes much to his influence and interest. To him was due in large measure the financing of Captain Scott's Antarctic expedition of 1901. "A History of the Abyssinian Expedition," 1869, relates the interlude of African travel, but his chief labors have been devoted to Peru, the land of his first voyaging. In the preface to one of his latest publications, "The Land of the Incas," he tells how, a naval cadet stationed on the Pacific coast, he fell under the fascination of the Andean land and how, stimulated by Prescott, he seized his first opportunity to return and engage in research on Inca civilization. An early result appeared in 1856, "Cuzco and Lima." A few years later he returned again, on this occasion under orders from the Government of India to procure cinchona plants from the Peruvian *montaña* for introduction into British India. While prosecuting this object he traveled many leagues of unknown country in the "golden valleys" of Caravaya. A memoir of the Countess of Chinchon details the history of the valuable plant, and "Travels in Peru and India," 1862, the success of his important mission. The explorer's versatile energies enabled him to render services to the executive of the Hakluyt and Royal Gographical Societies. To both he acted in turn as secretary and president for considerable terms. For the former he edited twenty-two volumes, among them his critical translations of the works of the Peruvian historians Cieza de Leon, Garcilasso de la Vega, Acosta, Sarmiento de Gamboa, and others. To the Royal Geographical Society Markham acted as secretary for twenty-five years and president for twelve (1893-1905), and his contributions to the *Geographical Journal* number some seventy papers. Of him it may be truly said that, without intermission, through a long and splendid lifetime he responded to the Society's behest "ob terras reclusas."

HERMANN GRAF ZU SOLMS-LAUBACH died on November 25, 1915, at the age of 73. To geographers he is best known through his brief exposition of the principles of plant geography, "Die leitenden Gesichtspunkte einer allgemeinen Pflanzengeographie," 1905. He had also written a paper on the origin, domestication, and distribution of the fig-tree (*Abhandl. Gesell. Wiss. Göttingen*, Vol. 28, 1881).

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in the January number, pp. 57-61.

NORTH AMERICA

General

KAWAKAMI, K. K. **Asia at the Door: A Study of the Japanese Question in Continental United States, Hawaii, and Canada.** With a prologue by Doremus Scudder and an epilogue by Hamilton W. Mabie. 269 pp. Fleming H. Revell Co., New York, 1914. $1.50. 5½ x 8½.

"Aside from the conflict of capital and labor, the greatest problem of the age, and of ages to come, is that resulting from contact between the East and the West. Of this great problem the Japanese question in America is . . . a small fragment." In these grave words Mr. Kawakami sums up the substance of his book. He is a Japanese who has lived long in America and has an American wife. He has become so thoroughly and genuinely Americanized that he not only speaks of how "*we*" have treated the Japanese and other "foreigners," but actually refers to "*our* Pilgrim forefathers." His plea is that the Japanese have never had a fair chance in America. This he proves by almost numberless instances. We have said to the Japanese that they must keep out because they are Asiatics. What Mr. Kawakami protests against "is the false notion that all Asiatics are 'undesirables,' while all Europeans are 'desirables.' Physiognomy, stature, and the color of the skin have no more bearing upon the moral character and intellectual quality of a man than the pattern of the garments he wears."

It is hard to dispute this statement. It is hard to prove that the Japanese are not at least as valuable citizens—the word seems ironical—as the Italians, Armenians, Turks, and Syrians who are admitted to our country and our citizenship without question. It is equally hard to prove that they are not willing to become Americanized. We have done all that we can to prevent them from liking us and from adopting our ways. If they retain their own habits we accuse them of not being willing to be Americanized; if they adopt our clothes and try to live our life we rail at them as cocky and bumptious. If we would treat them as we treat other foreigners, they would quickly become like the rest of us. That is the author's main contention. He even goes so far as to advocate intermarriage. He agrees that where drunken sailors are the fathers of children by outcast Japanese women the result is far from good, but where Japanese and Caucasians of good social position and similar ideals are married the homes "are usually happy, and the children . . . are both healthy and bright. In appearance, in temperament, in manner, such children [when living in America] are so completely American that one can hardly detect Japanese blood in their veins."

Mr. Kawakami is everywhere fair and courteous. He frankly admits the faults of the Japanese. He pictures both the good and bad sides of their life in America. He admits that we would be better off without some of them. At the same time he shows that they are no worse than other people including ourselves. His touch is gentle, but the claws prick at times and make the loyal American blush with shame that we should be so arrogant when we have so much that we could wish to conceal.

The races of the world are moving today as never before. We cannot keep them still. The Japanese and Chinese want to come here, we want to go to tropical lands and exploit them, the people of Europe want to go to Canada, Australia, Argentina, and many other places, and every energetic race wants to take its share in developing the undeveloped parts of the world. The result is that people are thrown out of adjustment, politically, socially, and physiologically. That is one of the causes of the European war, of our labor troubles, of our problems of vice, crime, imbecility, and of many other evils.

The way in which a new environment may possibly alter the character of a race may well cause us to pause and consider. Listen to this: "Dr. Edward A. Steiner, one of the foremost authorities on the immigation problem, in a recent address at Saint Louis sees the real menace for California not in Oriental immigration, but in the ebbing energy of its citizens. The pioneers of California who conquered all obstacles offered by nature were energetic, undaunted, and willing to toil. But the present generation, Dr. Steiner points out, is beginning to seek pleasure, avoid parenthood, and shirk hard work. And many Californians plainly admit that their young men no

longer soil their hands with the tilling of the earth, but migrate to the cities in quest of gentleman's work and easy money. The effect of this tendency is clearly shown in the census of 1910, which records considerable decrease in the farm lands in California. Some American writers go even so far as to assert that this very symptom of weakness on the part of Californians is one of the causes which brought about the agitation against the Japanese. . . . People begin to hate other races only when they are doubtful of their own superiority. The southern aristocrat never hated the negro; it was only those poor whites who were not so sure of their superiority that hated him."

We may not agree with all Mr. Kawakami's conclusions, but his book deserves careful study. The adjustment of race to race, and of races to new environments, is not easy, and light is needed from every available source. ELLSWORTH HUNTINGTON.

ALASKA

—— **Alaska, Natives of, Report on the Work of the Bureau of Education for the.** iv and 52 pp. Map, ills., bibliogr. *Bur. of Education Bull. No. 48.* Washington, D. C., 1915. [The broad range of educational activities in Alaska includes medical and sanitation work, to which is devoted 18 per cent of the total appropriation funds; promotion of industries and of co-operative and self-governing institutions; supervision of trade in fur, much more profitable to natives when it can be accomplished with the intermediary of a local trader; distribution of reindeer, now 66 per cent native-owned, and supervision of the industry. The reindeer herd during the year made a net increase of 22 per cent, and a trial shipment of meat was submitted to Seattle.]

KEEN, DORA. **Exploring the Harvard Glacier.** Ills. *Harper's Magazine,* Vol. 132, 1915, Dec., pp. 113-125.

CANADA

Yukon, Northwest Territories, British Columbia

CONNOR, A. J. **The Temperature and Precipitation of British Columbia.** 90 pp. Map, diagrs. The Meteorol. Service of Canada, Dept. of Marine and Fisheries, Toronto, 1915.

Director R. F. Stupart, of the Canadian Meteorological Service, plans to issue, from time to time, a series of "booklets" upon Canadian climates, under the editorship of Mr. A. J. Connor, the climatologist of the Service. All the data obtainable from meteorological observations made in Canada during the last seventy or more years will be analyzed and published in synoptic form, with discussion. The first of this new series deals with the temperature and precipitation of British Columbia. It is introduced by a map of British Columbia, showing the different climatic districts; a clear and striking plate giving the types of seasonal precipitation, in colors, for selected stations, fifteen in all, in the different climatic districts; and a second plate giving curves, in colors, of types of mean temperature and of mean daily range of temperature, for four stations, with the London curves added for purposes of comparison. The similarity of the London curves with those for British Columbia is striking. We are glad to see the map and these diagrams at the very beginning of the report. The reader starts off with a good general idea of some of the essential characteristics of the district before he reads a word of the discussion or has even glanced at the numerical tabulation. The author gives a clear and systematic account of the various climatic subdivisions, paying special attention to the seasonal means. At the end, the monthly, seasonal, and annual means and extremes of temperature and of precipitation are given in full for all the stations, the data for each station occupying one full page, which makes the tabulation clear and easy to use.

The first number of Doctor Stupart's new series is an excellent one. The second report will deal with the rich agricultural provinces of the Northwest and therefore will be of special interest to geographers. R. DEC. WARD.

ALLAN, J. A. **Parks in the Canadian Cordillera: Physical Features and Attractions in the Canadian National Playgrounds.** Ills. *Scientific American Suppl.,* No. 2083, Vol. 80, 1915, Dec. 4, pp. 360-362.

GOSNELL, R. E. **The Year Book of British Columbia and Manual of Provincial Information (Coronation Edition).** Ills., index, addenda. 406 pp. Published by authority [of the] Legislative Assembly, Victoria, B. C., 1911. $1. 9 x 6. [Addenda, pp. 359-406, have been added to the 1911 edition, bringing it down to 1914.]

Pre-Emptor's Map of British Columbia. 1:190,080. Sheets: Bulkley; Fort George; Graham Island; Lillooet; Nechako; Quesnel. Department of Lands, [Victoria], 1915.

Topographical map of the Rocky and Selkirk Mountains. 1:125,000. Department of the Interior, [Ottawa], 1914.

Alberta, Saskatchewan, Manitoba

—— **Climatic and Soil Conditions in the Canadian Pacific Railway Company's Irrigation Project, Western Section (near Calgary, Alberta), Report on the.** 24 pp. *Irrigation Series Bull. No. 3.* Dept. of the Interior, Ottawa, 1915. [Abstracted in the February number under "Irrigation in Alberta," pp. 141-142.]

—— **Duty of Water Experiments and Farm Demonstration Work.** 62 pp. Diagrs., ills. *Irrigation Series Bull. No. 4.* Dept. of the Interior, Ottawa, 1915. [By "duty of water" is meant the amount of water needed to supplement rainfall in irrigated areas. The report covers the work done in southern Alberta and Saskatchewan during the summer of 1914.]

UPHAM, WARREN. **Revision of the Map of Lake Agassiz.** *Journ. of Geol.*, Vol. 23, 1915, No. 8, pp. 780-784.

Saskatchewan, map showing disposition of lands. 1:792,000. Railway Lands Branch, Dept. of the Interior, Ottawa, 1915.

Southern Alberta, map showing disposition of lands. 1:792,000. Railway Lands Branch, Dept. of the Interior, Ottawa, 1914.

UNITED STATES

General

MILLIS, H. A. **Some of the Economic Aspects of Japanese Immigration.** *Amer. Econ. Rev.*, Vol. 5, 1915, No. 4, pp. 787-804.

The earlier struggle over Chinese immigration and the more recent struggle over the immigration of Japanese laborers arose chiefly from conflicts of standards involved —especially of economic standards. The volume of Japanese immigration has been small; only in California did these people ever form as much as two per cent of the population. The economic effects of Japanese immigration are shown in only a few occupations. The writer's main conclusions are:—"1. The discharge of others to give employment to Japanese was exceptional; for the greater part they were employed to fill vacancies and to supply the deficiency of laborers. . . . There was, nevertheless, considerable displacement incidental to the absorption of Japanese laborers. 2. The general effect of their employment was to retard the increase in wages. . . . 3. The augmentation of the labor supply, the low wages required, the convenience of the organization maintained for securing employment, and the efficiency of the Japanese . . . aided in the development of Western industries. 4. By stimulating industry, and by causing the labor cost to be lower than it would otherwise have been, the effect was to increase the profits of employers. 5. The Japanese have made good progress as farmers and as shopkeepers, and in some instances their competition has tended to reduce profits. 6. Though there are exceptions, the general effect of the employment of Japanese as agricultural laborers and of Japanese farming was to increase land values, to retard the subdivision of large tracts, and to deflect to other localities the tide of immigration to the West."

AVARD L. BISHOP.

PALMER, BEN. **Swamp Land Drainage, With Special Reference to Minnesota.** 138 pp. Index. *Univ. of Minnesota Studies in the Social Sciences No. 5.* Minneapolis, 1915. 10 x 6½.

WILLIAMS, I. A. **Drainage of Farm Lands in the Willamette and Tributary Valleys of Oregon.** 81 pp. Ills. *The Mineral Resources of Oregon*, Vol. 1, 1914, No. 4. Oregon Bur. of Mines and Geol., Portland. 10½ x 7.

Two dissertations advocating land drainage to increase productivity. The first considers what has been accomplished in various countries and compares with it what has been done in the United States, more particularly in Minnesota. Mr. Palmer gives a rather comprehensive view of land drainage in our country. He impresses the reader with the vast work involved in draining all our lands that are now swamp. Federal co-operation is essential. The author says it would be "economically foolish" not to drain in each case the "whole basin or watershed involved"; and, since "the greater part of our swamp reclamation problems are interstate," the work of one state independent of the neighboring state will fail to give permanence to the drainage work accomplished. The drainage laws of the states, data for Minnesota, and a bibliography are given.

Mr. Williams shows that though the Willamette Valley has been disappointing to many farmers who do not know just how to handle their lands, proper drainage, not necessarily expensive, will make the valley very desirable. For one who is not familiar with drainage methods, a better text-book could hardly be desired.

EUGENE VAN CLEEF.

North-Central States

ROBINSON, E. VAN D. **Early Economic Conditions and the Development of Agriculture in Minnesota.** vi and 305 pp. Maps, diagrs. *Univ. of Minnesota Studies in the Social Sciences No. 3.* Minneapolis, 1915. 13½ x 10½.

A book which will be of great service to workers in the history, economics, and geography of Minnesota. Its most important feature is a series of over two hundred maps and graphs which make up an atlas of Minnesota agriculture. Of special interest to the geographer are dot maps which show the production and, for recent decades, the acreage of the leading crops for each decade from 1850 to 1910. The statistics from which they are made are included in an appendix. A few maps should have had more careful editing. Figure 106 on page 112 is an example. This map shows the number and location of grist mills, saw mills, flax mills, and woolen mills in the state in 1885. It shows no saw mills in Winona and Wabasha Counties and no grist mills in the latter. At that time the city of Winona in Winona County was an important lumber center, and Wabasha County had both grist and saw mills.

In the preface the author recognizes the importance of geographic factors: "Since all extractive industries are largely controlled by physical environment, a preliminary survey of topography, soil, and climate was clearly indispensable." Such a survey is made in the opening chapter, but as much of the material covered by it is available in more complete form in another recent state publication and as comparatively little use is made of it in the interpretation of the maps and graphs, it might have been omitted as a separate chapter and, instead, included as needed in the interpretation of the maps. Such a treatment would have meant a material increase in the effectiveness of the exposition.

The remainder of the text outlines the history of Minnesota through the periods of French and English occupation and traces the events which led to the rapid settlement of the state after 1852. It describes the influence which the development of transportation on the Upper Mississippi River, the beginning of the lumber business, and the distribution of forest and prairies had in the development of agriculture and the settlement of the state during the pioneer period. It analyzes the factors which led to a state-wide adoption of a one-crop type of farming in the years from 1860 to 1880 and of those which in the next twenty years brought about a development of diversified farming. Numerous citations to source materials and an excellent bibliography increase the value of the text.

CHARLES C. COLBY.

BALDWIN, A. L. **Triangulation in West Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri.** 67 pp. Maps, diagrs., index. *U. S. Coast and Geod. Surv. Special Publ. No. 30.* Washington, D. C., 1915.

BARNES, B. A. **Geography in Detroit Elementary Schools.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 5, pp. 144-150.

HUELS, F. W. **The Peat Resources of Wisconsin.** xvii and 274 pp. Maps, diagrs., ills., index, bibliogr. *Wisconsin Geol. and Nat. Hist. Surv. Bull. No. 45: Econ. Series No. 20.* Madison, 1915.

—— **St. Louis, Consular District of, Trade of the, Report for the Year 1914 on the.** 35 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5512. London, 1915.

WEIDMAN, SAMUEL, AND A. R. SCHULTZ. **The Underground and Surface Water Supplies of Wisconsin.** xxii and 664 pp. Maps, diagrs., index. *Wisconsin Geol. and Nat. Hist. Surv. Bull. No. 35: Econ. Series No. 17.* Madison, 1915.

Michigan Island, Mich., mapped by Morgan H. Wright. 1:3,600. E. O. Wood, Mackinac, Mich., 1915.

[Railroad] map of Nebraska. 1:633,600. Nebraska State Railway Commission, Lincoln, 1915.

South-Central States

BOLTON, H. E. **Texas in the Middle Eighteenth Century: Studies in Spanish Colonial History and Administration.** 501 pp. Maps, diagrs., index, bibliogr. *Univ. of California Publ. in History, Vol. 3.* Berkeley, 1915.

This is an interesting study of frontier conditions. Up to the Louisiana Cession, 1762, Texas was the northeastern outpost of New Spain. Its development was governed by French policy, actual and imminent. Spanish interest lay in maintaining the somewhat indefinite boundary west of the Mississippi; hence the colony was almost exclusively of the mission and presidio type, and directed to this end were the early creation

of the easternmost post facing the French fort of Natchitoches and the rigorous trading laws. Any Frenchman found trading on Spanish territory without a license was committed to Acapulco and thence—an interesting bit of geography in itself—despatched to the farthest limit of the Spanish domain, to San Fernandez or Valdivia. Despite the law, the remoteness of this frontier prompted friendly relations between the rival posts, and one governor at least, Barrios, is strongly suspended of collusion with the French authorities in a profitable trading alliance.

In 1731, the beginning of the period under consideration, Spanish occupation was practically limited to a line of communications and three settlements along the belt of interior prairies, the home of the most amenable, agricultural tribes. The greater part of the shore line, peopled by hunting, fishing, cannibal tribes, was absolutely unknown until fear of English invasion led to the foundation by Escandón of the successful stock-raising colony of Nuevo Santander immediately south of the province of Texas; and fear of French aggression on the northern coast, to the creation of the fort and mission of San Augustin at the mouth of the Trinity River. At the same time an expansive period in the north and west was induced by a twofold motive: desire to subdue and proselytize the Apache and check the insiduous advance of French traders from beyond the Red River. With this object in view the San Sabá and San Xavier Missions were founded. Their long-lost sites have recently been identified by the author. Difficulties of controlling the nomadic hunting tribes of the splendid buffalo country of the West proved too great for the zealous fathers. The tentative hold of these and the coast missions and even the eastern post of Los Adaes is shown by their abandonment on the passing into effect of the Louisiana Cession. The only really successful missions was the central ones of the San Antonio. Spanish policy and geographic controls operated together to delay the European settlement of Texas.

BERRY, E. W. **Erosion Intervals in the Eocene of the Mississippi Embayment.** Maps, diagr. *U. S. Geol. Surv. Prof. Paper 95-F*, pp. 73-82. Washington, 1915.

CLINE, I. M. **The Tropical Hurricane of September 29, 1915, in Louisiana.** *Monthly Weather Rev.*, Vol. 43, 1915, No. 9, pp. 456-466.

ROCKWELL, W. L. **The Water Resources of Texas and Their Utilization.** Map, diagrs., ills. *Texas Dept. of Agric. Bull. No. 43*, pp. 7-87. Austin, 1915 (?)

Railroad map of Kentucky. 1:456,000. Railroad Commission, Frankfort, 1915.

Geologic map of Tennessee, compiled by O. P. Jenkins, Assistant Geologist. 1:500,000. State Geological Survey, [Nashville], 1915.

State of Mississippi, compiled from official records of the General Land Office, U. S. Geological Survey, and other sources, under the direction of I. P. Berthrong. 1:760,320. General Land Office, [Washington], 1915.

Western States

ATWOOD, W. W. **Eocene Glacial Deposits in Southwestern Colorado.** 26 pp. Map, diagrs., ills., bibliogr. *U. S. Geol. Surv. Prof. Paper 95-B.* Washington, 1915. [Abstracted in this number, pp. 217-218.]

MEXICO AND CENTRAL AMERICA

BAUER-THOMA, WILHELM. **Unter den Zapoteken und Mixes des Staates Oaxaca der Republik Mexico.** Ills. *Baessler-Archiv*, Vol. 5, 1915, No. 3, pp. 75-97.

CLUM, H. D. **Nicaragua.** 15 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 44e. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

DIETERLE, G. A. **De buitenlandsche handel van Guatemala.** *Tijdschr. voor Econ. Geogr.*, Vol. 6, 1915, No. 11, pp. 453-457. The Hague.

LUTZ, OTTO. **Beiträge zur Geologie des Panamakanals.** Diagr., ills., bibliogr. *Petermanns Mitt.*, Vol. 61, 1915, Sept., pp. 350-356; Oct., pp. 389-394. [A good summary of the geology of the isthmus, based mainly on the reports of Donald F. MacDonald, geologist of the Isthmian Canal Commission.]

NIDA, S. H. **Panama and Its "Bridge of Water."** 196 pp. Maps, diagr., ills., bibliogr. Rand, McNally & Co., Chicago, 1915. 50 cts. 7 x 4½. [A supplementary reader for fourth and fifth grades.]

PALMER, FREDERICK. **Central America and Its Problems.** xiv and 347 pp. Map, ills., index, bibliogr. Moffat, Yard & Co., New York, 1913. $1.25. 8½ x 5½.

SNYDER, A. G. **Panama.** 5pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 35b. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

URBINA, FERNANDO, AND HERIBERTO CAMACHO. **La zona megaseismica Acambay-Tixmadeje, Estado de Mexico, conmovida el 19 de Noviembre de 1912.** 125 pp. Maps, diagrs., ills., bibliogr. *Inst. Geol. de Mexico Bol. Num. 32.* Mexico, 1913. [This zone, which lies in a disturbed and volcanic terrain, is the focus of the earthquake of Nov. 19, 1912. The quake was of tectonic origin and has aroused interest on account of its intensity and its location in a new center close to Mexico City.]

—— **Vera Cruz, Consular District of, Trade and Commerce of the, Report for the Year 1914 on the.** 12 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5522. London, 1915.

International railways of Central America. Map of existing, proposed, and subsidiary lines. [1:475,000.] [United Fruit Co., Boston], 1915.

Topographical map [of the] mineral concessions and lands [in Honduras of the] New York & Honduras Rosario Mining Co., by J. H. Sinclair, C. E. 1:12,000. N. Y. & Honduras Rosario Mining Co., [New York], 1911.

Mapa de Costa Rica, segun los levantamientos efectuados de 1891 a 1898 por H. Pittier, Director del Instituto Fisico-Geografico Nacional . . . Dibujado por el Asistente Enrique Silva R. 1903. Correcciones efectuadas hasta 1914. 1:500,000. [White-print copy by] United Fruit Co., [New York, 1915]. [A copy, without hypsometric tints, of the map that appeared in *Ergänzungsheft No. 175 zu Petermanns Mitt.* (reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 44, 1912, pp. 797-798).]

The district of Panama, by Percy W. Ryde, F.R.G.S. [4 maps]: (a) Before the canal, 1:150,000; (2) Present day, 1:150,000; [the other two are bird's-eye views to correspond to the above]. G. W. Bacon & Co., Ltd., London, [1915].

WEST INDIES

—— **Cuban Tobacco Industry.** *South American Journ.*, Vol. 79, 1915, No. 23, pp. 457-458. London. [See also note on p. 219 on "The War and Cuban Commerce."]

MONAGHAN, J. C. **Jamaica.** 13 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 22c. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

Map of Porto Rico, compiled from the latest government sources by C. A. Reeds. 1:350,000. American Museum of Natural History, New York, 1915.

[Environs of San Sebastian, Porto Rico]. 1:100,000. [American Museum of Natural History, New York, 1915].

[Environs of Juana Diaz.] [18°6′-17°57′ N.; 66°33′-66°24′ W.]. 1:100,000. [American Museum of Natural History, New York, 1915].

SOUTH AMERICA

THE GUIANAS, VENEZUELA, COLOMBIA

WHIFFEN, THOMAS. **The North-West Amazons: Notes of Some Months Spent Among Cannibal Tribes.** xvii and 319 pp. Maps, diagrs., ills., index, bibliogr. Duffield & Co., New York, 1915. $3. 9 x 6.

To appreciate Captain Whiffen's work it is necessary to recall that Crevaux, "the Stanley of South America," explored the great region between the Amazon and the Meta, a tributary of the Orinoco, as long ago as 1879-1881. Martius had been there in 1820. Humboldt, twenty years before, had entered the northwestern corner of the Amazon basin by way of the upper Negro, and several of the conquistadors had explored its borders. Crevaux had resolutely traversed it by way of two great streams,—the Guaviare on the north and the Putumayo on the south. From that time on, the great tract between these rivers remained unknown until Dr. Hamilton Rice in 1907-1908 and again in 1912-1913 made his noteworthy explorations of the Rio Uaupes, Rio Içana, and the Rio Inirida, thus tying up the main drainage courses with Bogotá on the northwest and the Rio Negro on the southeast (*Geogr. Journ.*, Vol. 44, 1914, pp. 137-168; cf. maps). Some of the bordering country is almost as new as the region which Doctor Rice explored. Between the Napo and the Uaupes, for example, there is a large tract of country which has been explored but little except along the streams. It is here that Captain Whiffen conducted his explorations and studies over a period of a year, 1908-1909. He was accompanied by John Brown, a Barbadian negro who had married a woman from the Witoto tribe on the Issa River. It was through this relationship that the author was able to gain most of his information.

The geographical elements of the book are not easy to get at because scattered through

a mass of ethnological and other material, but as samples of interesting principles and facts the following may be given. The isolation of the forest is shown by the self-sufficiency developed by each group, which in turn has a marked effect upon the *mores*. For example, a man is prevented from ill-treating his wife by the fact that the other women would promptly make a song about it, and adverse opinion in a small self-contained group hostile to its neighbors is more efficient than any police force, whereas in a civilized community the wrong-doer may flee to another group, acquire new friends, and forget the past. Homicide within the tribe is not tolerated except for a capital offence, for if a man die it means the loss of a warrior: but these people live absolutely public lives, hence theft becomes a capital crime and an exception to the rule. The conditions of their forest life have led to the absence of laws of inheritance, since land is free for all to take who will. To our civilized ears it sounds strange to permit a man to take possession of land and the resources of the land at will but to suffer death for the theft of even a small object. The geographical distribution of dress is closely related to the geographical distribution of tribes and follows a regular progression, "and there is no sudden change in passing from one neighboring tribe to another, although the tribal distinctions are very marked."

A remarkable discovery was a drawing on bark cloth that is taken by the author to be the equivalent, among the Witoto tribe, of a map of the world. The map was made on beaten bark about two feet square. The center was divided into about a dozen squares, in which very crude human figures were represented fighting, planting, and hunting in their own territory. The dividing lines were of red vegetable pigment; on the margin were the sun, moon, and many stars.

Like other Amazonian tribes those of the northwestern Amazon country are required to break a fresh piece of ground after the second harvest, since the soil will produce but two crops in succession, though they return to the disused plantation for different palm fruits which continue to grow wild there. The qualifying test of a prospective husband and father is willingness to clear a plot of land and break and till the soil for a plantation. He need not qualify through house building, because he can share a corner in the great tribal house. For defense the Indians depend mainly upon the secrecy of the tribal dwelling, an easy matter in the absence of direct foot-paths. In addition, each tribe prepares a series of pitfalls in the forest avenues with poison stakes to impale the foe. The Indian paradise is upstream and not down because refuse is carried downstream.

The extent to which the Indian migrates is dependent upon the necessity for cultivating new plantations, for following game, and, in places, on the proximity of the white man. The migration of game is a serious matter for the Indian. Scarcity of animal life may even result in the abandonment of a homestead. Monkeys, one of the sources of food, are wanderers. When they have cleared one part of the forest of fruit and nuts they migrate to another.

The best photographs of native dances that have come out of this section of South America are contained in this book. Nothing so good has been published since Koch-Grünberg's "Zwei Jahre unter den Indianern," 1909.

Paraguay, Uruguay, Argentina, Chile

Charlevoix, P. F. J. de. **Historia del Paraguay, escrita en francés por el P. —, de la Compañia de Jesús, con las anotaciones y correctiones latinas del P. Muriel. Traducida al castellaño por el P. Pablo Hernandez.** (Series: Colección de libros y documentos referentes a la historia de América, Vol. 17.) 455 pp. Index. Libreria General de Victoriano Suarez, Madrid, 1915.

This is the fifth volume in the Spanish edition of Father Charlevoix's famous "Histoire du Paraguay." The authoritative nature of the work and its freedom from the gross exaggerations and absurdities of the time have always endowed it with pre-eminence. Shortly after its appearance it was translated into English and German. Spanish translations were also commenced but suppressed in consequence of the national attitude towards the Jesuits. The present volume treats of Paraguayan history between the years 1717 and 1737, the period occupied by the rebellion of José de Antequera and the subsequent anarchies inspired by it. Antequera, described in no favorable terms by the historian, was a typical figure of his age, and Paraguay, the isolated and unstable, gave him fit opportunity to play the rôle of tyrant, precisely as it had half a century before afforded Cárdenas and was later to offer Francia and Lopez. Beyond the illustration of some of the profound effects of isolation, the volume contains little of geographical interest. Of the Jesuit reductions nothing is described save their sufferings. They were heavy enough—disbanded and recalled and disbanded and recalled again, their progress interrupted and their numbers diminished, yet the Provincial was able to supply without delay 12,000 Indians to the Governor of La Plata for his final attack on the rebels. One or two allusions

reveal the jealousy with which the Fathers were regarded by their white and mestizo neighbors. The proposal to interdict their trade in yerba maté with Buenos Aires and Santa Fé is a specific instance.

—— **Paraguay, A Step in the Progress of.** Map, ills. *Bull. Pan American Union*, Vol. 41, 1915-16, No. 5, pp. 621-640. [The latest step in the economic development of Paraguay is the concession to an American firm for new port works at Asuncion.]

PUYSEGUR, ENRIQUE, AND H. B. POUYSSÉGUR. **Expedición al Iberá.** Map, diagrs. *Anal. Soc. Científica Argentina*, Vol. 78, 1914, No. 5-6, pp. 241-258; Vol. 79, 1915, No. 1-2, pp. 35-64; No. 3-4, pp. 135-164. [Notes on the natural history, physiography, and geology of the practically unknown region of the Laguna Iberá of northern Corrientes collected during the expedition of the Sociedad Científica Argentina of 1910. The first instalment of the article bears as signature the first name, the other two instalments, the second name.]

Plano geológico de la provincia de San Luis por el Dr. Enrique Gerth. 1:500,000. Accompanies "Constitución geologica, hidrogeologia, y minerales de aplicación de la Provincia de San Luis" por el Dr. Enrique Gerth, *Anal. del Minist. de Agric.: Secc. Geol., Mineralog. y Min.*, Vol. 10, No. 2. Buenos Aires, 1914.

EUROPE

FRANCE

SIEGFRIED, ANDRÉ. **Tableau politique de la France de l'ouest sous la Troisième République.** 536 pp. Maps. A. Colin, Paris, 1913. Fr. 12. 10 x 6½.

This is a truly brilliant essay toward the establishment of the geographical factor in politics. The existence of this factor has been recognized by analysts of political movements, but there has always been difficulty in extracting it from the tangle of motives which complicate the casting of a ballot. It can be operative only under a democratic system of government; it reaches its highest power under full manhood suffrage; it is restricted again by the development of strong national parties in which countrywide policies tend to outweigh local needs. In France the value of this factor is reduced by the limitations of the suffrage, but the absence of strongly dominant parties tends to enhance the operation of the geographical factor. Siegfried has taken for the present study a sufficiently large area where the conditions are fairly uniform. While we may not wholly accept the conclusions reached in this work, principally for the reason that the geographical factor does not appear satisfactorily cleared of modifying factors, yet we are to recognize the value of these results and to acknowledge that the author has added to the analysis of great political movements a new method of criticism whose value will become greater and greater just in proportion as we acquire facility in its application. His analysis of the different regions of western France thus brought under historical and critical review is most scholarly. WILLIAM CHURCHILL.

—— **Calais, Consular District of, Trade of the, Report for the Year 1914 on the.** 13 pp. *Diplomatic and Consular Reports*, Ann. Series, No. 5524. London, 1915.

CARRIGAN, CLARENCE. **Nantes.** 7 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 5f. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

—— **Corsica, Trade of, Report for 1914 on the.** 7 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5457. London, 1915.

—— **Havre, Consular District of, Vice-Consular Districts in the, Trade of the, Report for the Year 1914 on the.** 18 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5531. London, 1915.

RIGGS, A. S. **The Beauties of France.** Map, ills. *Natl. Geogr. Mag.*, Vol. 28, 1915, No. 5, pp. 391-491.

SWITZERLAND OR THE ALPS

WEBER, JULIUS. **Geologische Wanderungen durch die Schweiz: Eine Einführung in die Geologie. (Clubführer des Schweizer Alpen-Club.) Vol. 1: Mittelland und Jura.** 256 pp. **Vol. 2: Kalk- und Schieferalpen.** 377 pp. Ills., index. Rascher & Cie., Zürich, 1913(?) Mk. 2.40. 6½ x 4½.

In these litttle books the tourist who is a mere layman may find a valuable supplement to his Baedeker. Volume 1 opens with a synopsis of the rock species of Switzer-

land, describing the sedimentary rocks—mechanical, chemical, and organic; eruptive rocks, crystalline schists; the succession of the stratified rocks; the geological "zones" of Switzerland; and even touches upon geomorphology. The volume contains much of value in condensed form. While the tourist's guide book will direct him to the municipal museum of Solothurn, with its natural history collection where he may see interesting fossils from the Jura, including giant tortoises, this little book leads him to the limestones where he may find them. Volume 2 gives many geological cross-sections and maintains the excellence of description that characterizes the first volume. The districts treated are those most frequented by tourists. COLLIER COBB.

MAIN, A. **Le régime des cours d'eau des Alpes françaises.** Diagrs. *Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 3, 1915, No. 3, pp. 243-335. Grenoble.

Swiss touring-atlas (pocket edition), with alphabetical index of places and maps of six towns. [Road maps in 7th edit. 1:400,000.] Frobenius, Ltd., Basle, [1915?]. 7½ x 4½.

GERMANY

BAUMGARTEN, RICHARD. **Deutsche und Polen in Oberschlesien.** Ills. *Deutsche Erde,* Vol. 13, 1914-15, No. 7, pp. 175-179. Gotha.

BORRIES, EMIL v. **Die geschichtliche Entwicklung der deutschen Westgrenze zwischen den Ardennen und dem Schweizer Jura.** Map. *Petermanns Mitt.,* Vol. 61, 1915, Oct., pp. 373-377; Nov., pp. 417-422.

FRIEDERICHSEN, MAX. **Die Ostseesturmfluten der Jahreswende 1913-14 und ihre Wirkung auf Pommerns Küsten.** Diagrs., ills. *14. Jahresbericht der Geogr. Gesell. zu Greifswald, 1913-14,* pp. 357-368. [Accompanied by thirty-two photographs illustrating the erosional effects on the coast of Pomerania of the storms of Dec. 29-30, 1913, and Jan. 9-10, 1914, in the southern Baltic.]

HALBFASS, WILHELM. **Die Ausnutzung des Bodens als Acker- und Gartenland in Preussen im Jahre 1913.** *Petermanns Mitt.,* Vol. 61, 1915, Nov., pp. 437-439.

MARBITZ, HEINZ. **Phänologische Beobachtungen in Pommern.** *14. Jahresbericht der Geogr. Gesell. zu Greifswald, 1913-14,* pp. 369-383.

PRAESENT, HANS. **Beiträge zur Kenntnis des Greifswalder Boddens. I: Vorläufiger Bericht über die hydrographischen Untersuchungen des Geographischen Institutes der Universität im Greifswalder Bodden.** *14. Jahresbericht der Geogr. Gesell. zu Greifswald, 1913-14,* pp. 333-356.

RÜBENACK, WILHELM. **Grosse Geschiebe in Pommern.** *14. Jahresbericht der Geogr. Gesell. zu Greifswald, 1913-14,* pp. 321-331. [Continuation of the papers bearing the same title by W. Deecke, A. Haas, and E. Friedel in the eleventh volume of the annals of the Greifswald Society.]

RUSSIA

HUBBACK, JOHN. **Russian Realities, Being Impressions Gathered During Some Recent Journeys in Russia.** xv and 271 pp. Map, ills., index. John Lane Co., New York, 1915. $1.50. 5½ x 8.

It is often a far cry from impressions to realities, and in this case the sub-title must be taken as the real key to the book, for Mr. Hubback's journeys, together with his evident ignorance of Russian, could hardly permit him to feel the mainsprings of Russian life. With over eighty-five per cent of the population agriculturalists, one can hardly expect to see the real life of the people in the important trade centers of southern European Russia, the descriptions of which practically fill the book.

To whet the reader's appetite there is first of all a superficial historical outline. Then the journey begins in true Russian style with a religious touch, an Easter service in Odessa. One is in Bessarabia only long enough to see a wall built by Trajan, and, the next instant almost, the big cities of Russian and Austrian Poland are flying past, Warsaw, Cracow, and Lemberg. One is lost in a maze of churches in Kiev and then rushed off on a sketchy trip along the Black Sea, visiting the harbors from the Dnieper to the Don. Then one is charmed with southern Russia in the tender green of spring and the soft gold of the summer grain fields. Before one has half seen Moscow one is carried off to the Caucasus and then back into the mêlée of the battle of Poltava. Going eastwards again Rostov-on-Don and Astrakhan lie in our path to the wheat fields of the middle Volga. A word about the ubiquitous German merchant is of interest. One wonders who will replace him after the war and whether it will be an American. One pauses to glance at the scenes of the Crimean War, and then the journey is ended with a dash for England just as the war cloud was bursting.

As a faithful record of things seen the book contains some useful material. Were one not whisked about with such disconcerting rapidity one's after impressions would have less the character of poorly developed snapshots. The outward expression of impressions made on Mr. Hubback by his trips is hardly charming enough to inspire one to undertake a journey to Russia, but the impressions themselves, agreeable as they are, might accomplish this end. And therein would lie the great good of the book.

E. K. REYNOLDS.

ROSEN, H. **Die ethnographischen Verhältnisse in den baltischen Provinzen und in Litauen.** Map. *Petermanns Mitt.*, Vol. 61, 1915, Sept., pp. 329-333. [Accompanied by a map, 1:2,800,000, showing by *uyezds*—the administrative subdivision next in rank below the *gouvernement*—the proportional distribution of races (Letts, Esthonians, Lithuanians, Zhmuds, Poles, Great Russians, White Russians, Finns, Swedes).]

ITALY

—— **Dislivelli fra Adige e Brenta nella zona marittima: Studi nell' interesse della navigazione interna (Nota preliminare).** 10 pp. Map, diagr. *Ufficio Idrografico Pubbl. N. 35.* R. Magistrato alle Acque, Venice, 1911.

FABIANI, RAMIRO. **La regione montuosa compresa fra Thiene, Conco e Bassano nel Vicentino.** 83 pp. Maps, diagrs., ills., index, bibliogr. *Ufficio Idrografico Pubbl. N. 41 e 42.* R. Magistrato alle Acque, Venice, 1912. [Deals with the geology, physiography, and hydrography of the region. Accompanied by a geological map, 1:75,000, and a map indicating the permeability of the rocks, 1:100,000.]

GUARINI, EMILIO. **La guerra economica e la sua importanza nell'ora attuale: Espansione commerciale verso l' America Latina.** *L'Esplorazione Commerc.*, Vol. 30, 1915, No. 8-9, pp. 289-335.

KENDE, OSKAR. **Italien und die dalmatinische Inselfrage.** Map. *Kartogr. u. Schulgeogr. Zeitschr.*, Vol. 4, 1915, No. 9, pp. 145-149. Vienna.

MAGRINI, GIOVANNI. **Carte annuale delle pioggie nella regione veneta per il 1911.** 44 pp. Maps, index. *Ufficio Idrografico Pubbl. N. 43.* R. Magistrato alle Acque, Venice, 1912. [With rainfall map, 1:500,000; nine density grades shown.]

MAGRINI, GIOVANNI. **Carta annuale delle pioggie nella regione veneta per il 1909-1910.** 29 pp. Maps. *Ufficio Idrografico Pubbl. N. 33.* R. Magistrato alle Acque, Venice, 1911. [With rainfall map for each year, 1:500,000; nine density grades shown.]

MAGRINI, GIOVANNI. **Gli osservatori meteorologici della rete di 1° ordine dell' Ufficio Idrografico.** 24 pp. Diagrs., ills. *Ufficio Idrografico Pubbl. N. 64.* R. Magistrato alle Acque, Venice, 1915.

MAGRINI, GIOVANNI. **Norme ed instruzioni per il servizio mareografico. Parte 1: Osservazione delle maree.** 46 pp. Diagrs., ills. *Ufficio Idrografico Pubbl. N. 30.* R. Magistrato alle Acque, Venice, 1911.

MAGRINI, GIOVANNI. **Prima serie di misure di portata sul Mincio.** 9 pp. Ills., diagrs. *Ufficio Idrografico Pubbl. N. 52.* R. Magistrato alle Acque, Venice, 1915.

MAGRINI, G. **Sulla propagazione della marea nella laguna di Caleri.** Diagrs. 13 pp. *Ufficio Idrogr. Publ. No. 34.* R. Magistrato alle Acque, Venice, 1911. [Supplements Publication No. 32 of the same office.]

—— **Rome, Consular District of, Trade of the, Report for the Year 1914 on the.** 19 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5528. London, 1915.

TREDWELL, R. C. **Piedmont.** 12 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 8d. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

WILBER, D. F. **Italy.** 24 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 8c. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

Carta ippica d'Italia . . . di P. Bartolucci, indicante le varietà di cavalli che si possono produrre nelle varie regioni, e che esistono in Italia in base al Censimento Generale 1908. 1:1,250,000. Società Ippica Nazionale, [Rome], [1915?]. [Shows the distribution of the various breeds of horses in Italy according to the census of 1908 and indicates what breeds can best be raised in the various sections of the country.]

Carta topografica dei dintorni di Torino, disegnata da G. E. Fritzsche. 1:100,000. Istituto Geografico De Agostini, Novara, 1915.

AFRICA

Sahara, including Egypt

Crossland, Cyril. **Desert and Water Gardens of the Red Sea, Being an Account of the Natives and the Shore Formations of the Coast.** xv and 158 pp. Maps, ills., index. University Press, Cambridge, and G. P. Putnam's Sons, New York, 1913. $3.50. 6½ x 9½.

Mr. Crossland writes of the desolate Egyptian shore of the Red Sea with genuine affection. Yet even he does not pretend that the region is anything but one of the world's most hopeless deserts. In an intimate, friendly way he describes his own observations and experiences while serving as a British official at a lonely post north of Suakin. Living alone among the nomadic landsmen and equally nomadic fishermen, he came to feel that they belonged to him. The ethnologist will gain a few new examples from Mr. Crossland's descriptions of his village, and the geographer will get a vivid impression of the effect of extreme aridity and its resultant poverty upon the habits and character of a people who are among the most backward of British subjects. The real contribution of the book, however, lies in its discussion of corals and coral reefs. Here the author is thoroughly at home and writes with great enthusiasm. Anyone who wishes a clear and non-technical description of coral animals, their life and habits, and the methods by which reefs are formed will find the book helpful. So, too, will those who wish to appreciate the beauty that surrounds the Red Sea coast in spite of man's sordidness.

Ellsworth Huntington.

Dolot, Général. **Cinq semaines en Egypte.** Map. *Bull. de la Section Tunisienne, Soc. de Géogr. Comm. de Paris,* 1913-14, No. 4, pp. 27-130.

—— **Port Said, Consular District of, Trade of the, Report for the Year 1914 on the.** 18 pp. Maps. *Diplomatic and Consular Repts.,* Ann. Series, No. 5474. London, 1915.

Sudan and Upper Guinea

—— **Mission Tilho (1906-1909), Documents Scientifiques de la: Vol. 3.** 485 pp. Map, ills. Ministère des Colonies (issuing bureau); E. Larose (publisher), Paris, 1914. 11 x 7.

The great geographical achievement of the Tilho Mission to Lake Chad was the minute study of that mysterious lake. We are using Captain Tilho's fine map of the lake today, and our present detailed knowledge of Lake Chad and of the country of Kanem to the north of it is derived mainly from the patient researches of Tilho and his scientific staff. The Mission, however, was equipped to carry on studies in other fields than geography, and, with the support of the French Colonial Ministry, three volumes of scientific papers, supplemental to Captain Tilho's general report of the expedition have now been published (for notice of Vol. 1 see *Bull. Amer. Geogr. Soc.,* Vol. 43, 1913, p. 303).

The third volume consists of papers based upon the work and natural history collections of the Tilho Mission, supplemented to some extent by zoölogical collections of other scientific investigators. The first paper (pp. 1-111), a reprint of which was reviewed in the *Bull. Amer. Geogr. Soc.* for July, 1915, p. 541, is a remarkable study by Dr. R. Gaillard, physician of the Tilho Mission, and L. Poutrin, of the Paris museum of natural history, on the anthropology of the Chad and Kanem regions, based upon measurements and other physical studies. The conclusion is reached that, while this work has brought new elements to light in our knowledge of man in the Chad region, it does not elucidate the vexed problems of the original peopling of this part of Africa. It may be, when similar studies are made of the surrounding peoples, that the problem, upon which history throws no light, will be nearer a solution or completely solved.

The other papers are "Crânes de la région du Tchad," by Dr. P. Rivet (pp. 115-118); "Reptiles et batraciens," by Dr. Jacques Pellegrin (121-129); "Les poissons du bassin du Tchad," by Doctor Pellegrin (133-282); "Seconde notice malacologique," by Louis Germain (285-322); "Étude sur les diptères recueillis par la Mission Tilho," by J. M.-R. Surcouf (325-458); "Les collection botaniques rapportées par la Mission Tilho, avec indications sur les plantes utiles," by François Pellegrin (461-484). Photographs and line drawings are numerous.

—— **Guinea española: Reclutamiento de braceres.** *Rev. de Geogr. Colon. y Mercantil,* Vol. 12, 1915, No. 11-12, pp. 417-420. Real Soc. Geogr., Madrid. [In May, 1914, a contract was ratified between Spanish Guinea and Liberia under which the former was enabled to secure native labor from Liberia for Fernando Po.]

MILBOURNE, A. H. **Palm Kernels from West Africa: Movement to Establish the Industry in Great Britain.** *Journ. African Soc.*, No. 58, Vol. 15, 1916, pp. 133-144.

YERBY, W. J. **French West Africa.** 4 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 69a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

CONGO BASIN AND LOWER GUINEA

DANCKELMAN, A. VON. **Eine geplante jüdische Ackerbaukolonie in Angola.** *Petermanns Mitt.*, Vol. 61, 1915, Sept., pp. 357-358.

IGINIO, BADOLO. **Note sui commerci del Congo Belga.** 9 pp. *Direz. Gen. degli Affari Commerciali* [*Publ.*] *No. 12.* Minist. degli Affari Esteri, Rome, 1915.

MCBRIDE, H. A. **Belgian Kongo.** 11 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 64a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Industry in the Belgian Congo is still in the purely extractive stage and hence is peculiarly susceptible to outside influences. The early days of the war suddenly cut off trade with the mother country, upon whom the colony had been practically entirely dependent for import and very largely—over 75 per cent—for export markets.]

SOUTH AFRICA

LAITE, W. J., comp. and edit. **Laite's Commercial Blue Book for South Africa, 1915: A Practical and Comprehensive Book of Reference on South African Trade.** 635 pp. Map. South African Publishers, Ltd., Cape Town, 1915. 10s. 8½ x 6.

The fullest compendium published of facts and figures relating to the trade of South Africa. The map (listed below) shows the distribution of agricultural, mineral, and other products and the railroad net of South Africa. The junction is indicated of the railroad system of the Union of South Africa with that of German Southwest Africa (see *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 879). Coal is not indicated at Wankie, although this occurrence is one of the large sources of this fuel in South Africa. Twenty pages are given to the official records of meteorology and climate.

GOULDSBURY, CULLEN. **Notes on the Customary Law of the Awemba and Kindred Tribes. Part I. The Law of Torts; The Law of Crimes. Part II. The Law of Personal Relations and the Law of Contract.** *Journ. African Soc.*, No. 57, Vol. 14, 1915, pp. 366-385; No. 58, Vol. 15, 1916, pp. 157-183. London. [Tanganyika district, Northern Rhodesia.]

HANN, J. VON. **Der tägliche Gang der meteorologischen Elemente zu Johannesburg (Transvaal): Temperatur, relative Feuchtigkeit, Verdunstung, Regenmenge, Sonnenschein, Gewitter.** *Meteorol. Zeitschr.*, Vol. 32, 1915, No. 10, pp. 463-467.

WILSON, THOMAS. **Black and White in South Africa.** Ills. *Proc. Royal Philos. Soc. of Glasgow*, Vol. 45, 1913-14, pp. 94-115. [In Cape Colony, Natal, Transvaal, and the Orange Free State, there are 1,278,025 whites, of whom 14.5 per cent are in the state- or state-aided schools; there are 4,680,420 colored persons, of whom only 3 per cent are in these schools.]

Map of production (showing routes of railways in South Africa). [1:5,700,000.] Accompanies "Laite's Commercial Blue Book for South Africa," South African Publishers, Ltd., Cape Town, 1915.

Der Victoria-Njansa. 1:1,000,000. Accompanies "Der Victoria-Njansa" von Dr. Joachim Perthes, Justus Perthes, Gotha, 1914. [The monograph which this map accompanies was reviewed in the *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 889.]

MADAGASCAR AND ADJACENT ISLANDS

CARTER, J. G. **Madagascar.** 13 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 70a. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [Madagascar continues to make noteworthy progress in many branches of agricultural industry.]

CARTER, J. G. **Mauritius.** 4 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 65b. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

—— **Réunion, Trade of, Report for the Year 1914 on the.** 10 pp. *Diplomatic and Consular Repts.*, Annual Series, No. 5530. London, 1915.

ASIA

General

COLES, L. A. **The Home of Man. Part 4: Asia.** (Series: The New Outlook Geography.) 192 pp. Maps, ills., index. G. G. Harrap & Co., London, 1914. 1s. 3d. 7½ x 5.

This school text is written for the senior forms in the Cambridge (England) examinations. It contains no new material, but the method of its presentation of geographical material is to be commended for clearness and directness. There are many small, clear, black-and-white maps and diagrams. Pictures are few and help the text. The Indian Empire has the best material. China, Japan, and the East Indies are well treated, though with rather more detail than is necessary. The first chapter, concerning ocean depths, winds, and currents, applies to the world as a whole rather than Asia. The use of "antitrades" for "westerly winds" is awkward, and the wind diagram on page 14 is incomplete. At the close of each chapter is a heavy load of mere mechanical exercises in graphs, rainfall curves, and statistics. The book is suggestive to American teachers for the methods of presentation and the use of problems, practical suggestions, and exercises.

W. M. GREGORY.

HEATON, E. W. **A Regional Geography of the Six Continents. Book 2: Asia.** 86 pp. Maps, ills. Ralph, Holland & Co., London, 1914. 9d. 7½ x 5.

The content and nature of this book may best be indicated in the author's words: "We are going to look at each continent separately, divide it up into broad 'natural regions' or 'geographical units,' and notice the similarities of each part of the same broad region and the contrasts between any one region and its neighboring geographical units." The material is very good but given in an encyclopedic form. It is thoroughly condensed, making a desirable type of reference book for the teacher of elementary students rather than for the pupils themselves, though the text is intended for elementary students.

EUGENE VAN CLEEF.

Manchuria, Korea, Japan

ISHIZU, R[ISAKU], edit. **The Mineral Springs of Japan, with Tables of Analysis, Radio-activity, Notes on Prominent Spas, and List of Seaside Resorts and Summer Retreats.** Specially edited for the Panama-Pacific International Exposition. viii and 367 pp. Maps, diagrs., ills., index. Tokyo Imperial Hygienic Laboratory, 1915. 8 yen. 12 x 9½.

It is difficult in a short review to do justice to this splendid work, which is so characteristic of Japanese energy and thoroughness. Some idea of its scope may, however, be gained from the chapter headings, which include: volcanoes and mineral springs of Japan; geology of Japan; general remarks on hot springs of Japan; determinations of radium emanations and electric conductivity; sinter deposits from the mineral springs; the geysers of Atami and Onikobe; radio-active minerals of Japan. All these are included in Part I, while Part II is given over largely to statistical data.

More than 1,500 mineral springs have already been studied and analyzed. Most of these are located in regions of volcanic activity, but others are found along lines of dislocation away from volcanic zones, and some are even in old plutonic rocks. Many are active in depositing sinter, and in one case a calcium carbonate deposit five centimeters thick accumulated in a wooden trough in less than eight years. The radio-active springs, which are located in the northwestern of the four quadrants into which the intersecting longitudinal and transverse tectonic lines of the islands divide them, are all in granite, and it is pointed out that two of them, Masutomi and Misasa, are among the most radio-active springs known in the world. The radio-active minerals of Japan include a new one named *hokutolite*, a mixture of $BaSO_4$ and $PbSO_4$, deposited by a spring in Taiwan (Formosa).

The report also contains numerous data on the springs of other countries, not the least interesting being the comparative tables, in Part II, of mineral springs arranged according to radio-activity, temperature, flow of water, and quantity of solid ingredients. These also give the class of waters and kind of rock from which each spring issues.

The work closes with a detailed account of the different Japanese health resorts. Numerous excellent illustrations add greatly to the value of the work. HEINRICH RIES.

BRINKLEY, F., with BARON KIKUCHI, collab. **A History of the Japanese People from the Earliest Times to the End of the Meiji Era.** xi and 784 pp. Maps, ills., index. The Encyclopædia Britannica Co., New York, 1915. 6 x 8.

The object of this highly creditable work by the late Captain Brinkley may be said

to be not so much to offer fresh contributions to the knowledge of Japanese history as to make its chief events and personalities accessible to the English-reading public by means of a catholic narration done in a graceful style and following on the main the traditional line of thought current among Japanese of the old type of culture. The work is decidedly stronger on the descriptive side than on the analytical, namely in personal and social relations, in the chronicling of well-known events, and in depicting customs and manners, than in the critical examination of economic, institutional, and cultural forces that have fashioned the evolution of national life and blossomed forth in those phenomena which lend themselves to a descriptive treatment. Herein consist the strong and weak points of this work, so remarkable in wealth of details and literary charm. From this it naturally follows that the work does not aim to develop the theme which would be the chief interest of this journal, that is, the geographical background of Japanese history. For there is little space in a descriptive work like this that may be devoted to an analysis of the remarkably complex geographical and climatic conditions of Japan and their far-reaching effects upon her history in all ages. There are only brief references merely to topographical aspects, and these do not include even the vital relation to national history of so evident a factor as the peculiar position of the Japanese archipelago, exposing it to multifarious climatic influences from the seas and the Asiatic continent. As regards the subtler and more profound effects that may be traced on Japan's career from this and other equally important features of her geography, the reader must be content with no answer at all. The work is entitled to a distinguished place in historical literature in English for its successful chronicling of Japanese annals; as for its value to the student of geographical influence upon history, it must be sought in the abundant historical data it furnishes, which he might seek to interpret by means of a knowledge of Japanese geography gained elsewhere.

K. ASAKAWA.

— **Hakodate, Consular District of, Trade of the, Report for the Year 1914 on the.** Map. 19 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5478. London, 1915.

HUGGINS, H. C. **Japan.** 15 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 55e. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

MILLER, R. S. **Chosen (Korea).** 7 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1915, No. 55f. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C.

—— **Osaka, Trade of, Report for the Year 1914 on the.** 24 pp. Map. *Diplomatic and Consular Repts.*, Ann. Series, No. 5510. London, 1915.

—— **Shimonoseki, Consular District of, Trade of the, Report for the Year 1914 on the.** 20 pp. *Diplomatic and Consular Repts.*, Ann. Series, No. 5516. London, 1915.

MALAY ARCHIPELAGO, INCLUDING THE PHILIPPINES

BROWN, J. M. **The Dutch East: Sketches and Pictures.** xvi and 222 pp. Ills. Kegan Paul, Trench, Trübner & Co., Ltd., London, and E. P. Dutton, New York, 1914. $3.50. 9 x 6.

There is much that is interesting in these newspaper sketches, yet the work as a whole is superficial. Two themes in particular have engaged the author's interest: one is that the Malay Archipelago was populated from the Pacific; the other that sago is destructive to all spirit of human enterprise. The latter follows a common fallacy of logic; he has found men of primitive type living on sago as a staple, but it does not follow that sago as food produces savage barbarism. The idea that Indonesia received its population from Polynesia was rejected by all ethnologists as soon as it was proposed, and it is unfortunate that renewed currency should now be given to it. The problem of Indonesia and Polynesia is sufficiently intricate as it stands, without this addition. We may not be certain as to the time of the great migration; debate continues as to the track of the folk movement toward the Pacific, but it is clearly established that, at some remote epochs, two great waves of migration left Indonesia and colonized the South Sea (for the older migration we are able to establish the general track of migration, and probably we can identify two tracks around New Guinea). For this reason it is to be regretted that this author writes so confidently of a view of the ethnic problem which is quite unsupported by the facts and which has no authority sufficient to entitle it to consideration.

WILLIAM CHURCHILL.

CHRISTIE, E. B. **The Subanuns of Sindangan Bay.** 121 pp. Map, ills. *Philippine Bur. of Science, Division of Ethnology, Publications,* Vol. 6, Part I. Manila, 1909. 10½ x 7½.

Mr. Christie provides brief word lists without discussion; these the reviewer has incorporated, duly credited, in his far more extensive vocabulary of the people and has also utilized them in his discussion of the linguistic problems individual to these shy folk in the mountains of southwestern Mindanao and to the broader theory of their place in philological systems (Finley and Churchill: The Subanu). In the record of the life of the people, Mr. Christie has written at considerably greater length than Colonel Finley. Their points of observation are not quite the same. Mr. Christie has the distinct advantage of being trained in the methods of social anthropology; Colonel Finley, as a military commander under the necessity of establishing order in a troubled community, and later as a civil administrator, regarded the Subanu from a different angle, yet in the course of eleven years of work with and upon these savages he acquired a close insight into their life and a warm sympathy for them. WILLIAM CHURCHILL.

CHRISTIE, E. B. **Notes on Irrigation and Co-operative Irrigation Societies in Ilocos Norte.** Ills. *Philippine Journ. of Science: Sect. D,* Vol. 9, 1914, No. 2, pp. 99-113. [See the abstract on p. 222.]

DENINGER, KARL. **Geographische Übersicht von Westseran.** Map, bibliogr. *Petermanns Mitt.,* Vol. 61, 1915, Oct., pp. 385-388.

Geologische schetskaart van het westelijk gedeelte van het eiland Soembawa. 1:500,000. Accompanies, as Pl. 2, "Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië," Vol. 42, 1913. M. Nijhoff, The Hague, 1915.

Geologische overzichtskaart van een deel der Tidoengsche Landen, N. O. Borneo. 1:500,000. Accompanies, as Pl. 2, "Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië," Vol. 42, 1913. M. Nijhoff, The Hague, 1915.

Geologische schetskaart van het eiland Enggano, met gebruikmaking van de Top. schetskaart door J. H. Juda. 1:200,000. Accompanies, as Pl. 8, "Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië," Vol. 42, 1913. M. Nijhoff, The Hague, 1915.

Geologische schetskaart van een gedeelte der afdeelingen Makasser en Boni, Gouvernement Celebes en Onderhoorigheden. 1:150,000. Accompanies, as Pl. 9, "Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië," Vol. 42, 1913. M. Nijhoff, The Hague, 1915.

AUSTRALASIA AND OCEANIA

AUSTRALIA, NEW ZEALAND

HEDLEY, CHARLES. **An Ecological Sketch of the Sydney Beaches.** Diagrs., ills. *Journ. and Proc. Royal Soc. of New South Wales,* Vol. 49, 1915, Part 1, pp. 15-77. Sydney.

HUNT, H. A. **Australian Monthly Weather Report and Meteorological Abstract, [for] September, October, November, 1912.** Maps, diagrs. Vol. 3, 1912, No. 9: pp. 419-464; No. 10: pp. 469-514; No. 11: pp. 519-565. Commonwealth Bur. of Meteorol., [Melbourne], 1915.

[Geological map of] Tatonga. 1:31,680. Geological Survey of Victoria, [Melbourne], [1915].

[Geological map of] Keelangie. 1:31,680. Geological Survey of Victoria, [Melbourne], [1915].

[Geological map of] Mudgeegonga. 1:31,680. Geological Survey of Victoria, [Melbourne], 1915.

[Geological map of] Bungil. 1:31,680. Geological Survey of Victoria, [Melbourne], 1915.

Geological sketch map of portion of Eyre's Peninsula. 1:570,240. Accompanies "The Supposed Oil-Bearing Areas of South Australia," *Geol. Surv. of South Australia Bull. No. 4.* Dept. of Mines, Adelaide, 1915.

Map of the Buller coalfield, showing coal-bearing areas and general geology. 1:31,680. Accompanies "The Geology and Mineral Resources of the Buller-Mokihinui Subdivision, Westport Division," by P. G. Morgan and J. A. Bartrum, *New Zealand Geol. Surv. Bull. No. 17.* Dept. of Mines, Wellington, 1915.

(a) Geological map of Mokihinui, Ngakawau, Orikaka, and part of Lyell survey dis-

tricts. 1:63,360. (b) Geological map of Steeples and Kawatiri survey districts. 1:53,360. (c) Geological map of Waitakere survey district. 1:63,360. (d) Geological map of Ohika survey district. 1:63,360. (e) Map of the Buller-Mokihinui subdivision, showing fault-lines. 1:253,440. Accompany, as Maps Nos. 3, 4, 5, 6, and 9, respectively, "The Geology and Mineral Resources of the Buller-Mokihinui Subdivision, Westport division," by P. G. Morgan and J. A. Bartrum, *New Zealand Geol. Surv. Bull. No. 17.* Dept. of Mines, Wellington, 1915.

OCEANS

—— **Hydrographique, Bulletin, pour l'Année Juillet 1913-Juin 1914.** xiii, 46, 37 and 42 pp. Maps, diagrs. Publié par le Bureau du Conseil Permanent International pour l'Exploration de la Mer. A. F. Høst et Fils, Copenhagen, 1915. 13 x 10½.

Just a year of observations—18,000 in all—and some twenty-four plates to illustrate them.

Part A has four charts of isohalines for the surface waters of the North Atlantic and four for the North Sea, based on some 8,000 observations of surface salinity and temperature in the year July, 1913-June, 1914. In the North Atlantic the isohaline of 37 grams salt to 1,000 grams sea water extends between the parallels 20° and 30° N. The 35-gram line extends from Iceland to a little south of the Banks of Newfoundland. The May chart shows the Gulfs of Finland and Bothnia with salinities only 3 grams at their heads. The warmest Atlantic water noted near the European coast was 61° F. in 51°19′ N. and 12°30′ W.—this in September. The coldest water, 32°, occurred about a degree southeast of there on March 27. There is nothing unusual about either, except to worshippers of the Gulf Stream. In the North Sea 59° to 61° occurred near Holland in July and August, with 54° off the coast of Scotland. In January and February the temperature in the southeast is 45° to 50°. Air temperatures in Holland and Belgium were a little cooler than the adjacent sea *at all seasons,* but the British coast air was warmer in winter than the water.

Part B has numerous salinity and temperature sections across the North Sea and Baltic. The waters were a trifle salter in the depths than at the surface. Temperatures in the North Sea were often the same from top to bottom, even in depths of 100 meters. In the Norwegian Channel the bottom water was a good deal colder.

Part C has a few observations on the gas content of the Baltic waters and more than 5,000 records of tidal currents, giving direction and force at ten light-ship stations about the North Sea. Many of these were taken at depths of 5, 10, 15, 20, 25, and 30 meters, as well as at the surface. Tidal ellipses are drawn for all stations.

MARK JEFFERSON.

MERZ, ALFRED. **Neue Anschauungen über das nordatlantische Stromsystem.** *Zeitschr. Gesell. für Erdkunde zur Berlin,* 1915, No. 2, pp. 111-122.

These pages are an echo of Nansen's "Waters of the Northeastern North Atlantic" (reviewed in the *Bull. Amer. Geogr. Soc.,* Vol. 47, 1915, p. 141). On the ground of an inclination of the isopycnic surfaces—surfaces of equal density—to the east in the Atlantic waters off the coast of Ireland and Spain, Nansen had inferred a current to the north along that whole coast toward Norway, a deep current with salt warm underwaters from the Straits of Gibraltar. Nansen thought the Gulf Stream Drift hardly contributed more to the "Irish Stream" than some water occasionally blown upon its surface. He contradicted the usual belief in a south-setting current off the Spanish coast by assuming his current here to extend from bottom to surface. Ships' observations had been supposed to show that the waters did drift southward, "a southward branch of the Gulf Stream Drift." His only evidence of northward motion at the surface was the northward baying of the isohalines toward the Bay of Biscay and the Irish Sea, especially pronounced in spring. But Merz thinks this may be due not to a surface current but to climatic considerations. In winter ocean currents are deeper because the surface waters are cooled more nearly to the temperature of the water below; there is mingling, and motions penetrate. The shallow summer currents are swift, as the whole momentum is applied to the smaller mass of the warm surface water. Here comes Merz's contribution. The Gulf Stream Drift passes through a region of heavy rain in the North Atlantic. It is often more salt in summer because it *moves faster through the rainfall* and receives less of it per unit. But off the Spanish coast evaporation is great, and here the slow winter waters *become salter as they linger.* So Merz concludes that at the surface the Gulf Stream Drift passes south along the Spanish coast with northward flow beneath.

MARK JEFFERSON.

BRENNECKE, W. **Ozeanographische Arbeiten S. M. S. "Möwe" in westlichen Indischen Ozean 1913.** Diagr. *Annal. der Hydrogr. und Marit. Meteorol.*, Vol. 43, 1915, No. 8, pp. 337-343.

HANN, J. v. **Dr. J. P. van der Stok: Das Klima des südöstlichen Teiles der Nordsee.** *Meteorol. Zeitschr.*, Vol. 32, 1915, No. 10, pp. 471-475. [Abstract of a monograph by Van der Stok.]

HENSEN, V. **Die Auswertung der Bodenorganismen des Meeres.** Map, ills. *Die Naturwissenschaften*, Vol. 3, 1915, No. 45, pp. 601-606. [Experiments undertaken by C. G. J. Petersen, director of the Danish biological station, with a view to increasing the supply of food fishes in coastal waters.]

MATHEMATICAL GEOGRAPHY

SURVEYING AND GEODESY

HUGERSHOFF, R. **Die geodätischen und astronomischen Instrumente des Forschungsreisenden: Systematische Übersicht über erprobte und zweckmässige Konstruktionen.** Bearbeitet von ——. 60 pp. Ills. Gustav Heyde, Dresden, 1913. Mk. 2. 9 x 6½.

This "systematic summary of types of instruments which have been tested and proven suitable" for the explorer includes only those surveying instruments of a portable nature which the traveler or reconnaissance officer might be expected to ask for. In its own field it covers everything from a pace tally to a pantograph. A cut is shown of each instrument, accompanied by a short description, a price list and references to a bibliography of German works on surveying and surveying instruments. All instruments are of the latest types, the theodolites being especially good and moderate-priced. Several special slide-rules and calculating machines adapted for simplifying the reduction of observations are shown. JAMES GORDON STEESE.

POYNTING, J. H. **The Earth: Its Shape, Size, Weight, and Spin.** 141 pp. Ills., index. University Press, Cambridge, and G. P. Putnam's Sons, New York, 1913. 40 cents. 6½ x 5.

Although the preface says that the aim of the book is "to explain in a general way without mathematical detail, how the shape and size of the earth have been determined," sufficient mathematics are introduced to place the literature beyond the capacity of the average teacher who has not specialized in this field.

The explanation of the movement of air in a cyclone is not entirely consistent, as witness the statements: "It [the air moving from the south pole northward] keeps moving into regions traveling less rapidly to the east than the regions from which it has come" and the correct statement, "as it [air moving from the north pole] moves southwards it will be continually moving into regions with a greater west-to-east motion than its own."

Explanations are materially aided by the presence of a number of diagrams. Several interesting theories are advanced, while those already in existence are rather carefully discussed. EUGENE VAN CLEEF.

PHYSICAL GEOGRAPHY

GENERAL

MATTHEW, W. D. **Climate and Evolution.** *Annals N. Y. Acad. Sci.*, Vol. 24, pp. 171-318. Feb. 18, 1915.

This paper is fundamental and revolutionary. It is of primary importance for the geographer and biologist as well as for the geologist. It crystallizes a growing tendency in which Chamberlin stands out as a prominent leader. That tendency is to reject the old idea of a great number of land bridges, which geologists have been wont to postulate wherever necessary in order to explain puzzling facts in the distribution of living forms. In its place there is substituted the hypothesis that "secular climatic change has been an important factor in the evolution of land vertebrates and the principal known cause of their present distribution." Such changes, coupled with the alternate expansion and restriction of the continents by emergencies or submersals of one or two thousand feet, are held to be sufficient to account for a large portion of the facts as to organic evolution.

Doctor Matthew's line of argument runs briefly thus: Recent studies of isostasy and of the strength of the earth's crust make it less and less probable that there can have been great changes in the relative size of continental land masses and oceanic basins.

The chances are that the present continents have existed in the rough throughout a large part of geological times without any marked projections beyond the limits of the present continental shelf. This is in harmony with the paleontological record, especially the mammalian portion, from which our chief information as to the lands is derived. The study of almost any great branch of mammals shows that the most highly developed forms are found in the cool temperate continental areas such as North America and especially Eurasia. The old idea was that the original home of a family of animals was where the lowest forms are found. This seems to be a mistake. The low forms represent those that have failed to respond to new conditions of environment. As the climate has fluctuated from the warm, moist conditions of oceanic expansion and small, low continents to the severe, cold conditions of expanded continents and great elevation, the feebler, less progressive types of animals have migrated with the climate, while the stronger, more progressive types have remained in the old locations and adapted themselves to the new environment. Thus the forms found in great continental centers such as Asia are comparatively high, while the allied forms in less rigorous habitats such as the more equatorial lands represent the primitive types which fled instead of facing the new environment.

In conformity with this hypothesis Doctor Matthew traces the development of a large number of diverse families. He shows that the predominant tendency is toward migration from a center in central Asia. The size of that continent has rendered it particularly subject to great climatic extremes, and these have caused rapid evolution as well as a rapid dispersal into areas of less severity. A summary of Doctor Matthew's conclusions as to man well illustrates his method. "All authorities," he says, "are today agreed in placing the center of dispersal of the human race in Asia." There we find the most ancient human remains. Around its borders grew up the earliest great civilizations, in Chaldea, Asia Minor, and Egypt on the west, India on the south, and China on the east. Perhaps the greatest fact in history is the migrations from this region into China, India, Africa, and Europe. In America the history of migration is from Alaska southward. Today the most primitive races are found in South America, Africa, Australia, southern India and other places which are difficult to reach from Central Asia. The old assumption was that man was of tropical origin and came from the places where now he is most primitive. In opposition to this it appears that the higher races are today obviously "adapted to a cool temperate climate, and to an environment rather of grassy plains than of dense moist forests." Even the tropical negro race reaches its "highest physical development not in the great equatorial forests but in the drier and cooler highlands of East Africa; and when transported to the temperate United States, the West Coast negro yet finds the environment a more favorable one than that to which his ancestors have been endeavoring for thousands of years to accustom themselves. . . . It seems fair to conclude that the center of dispersal of mankind . . . was central Asia north of the great Himalayan ranges and that, when by progressive aridity that region became desert, it was transferred to the regions bordering it to the east, south, and west. We may further assume that the environment in which man primarily evolved was not a moist or tropical one but a temperate and more or less arid one, progressively cold and dry during the course of his evolution."

The last sentence expresses Doctor Matthew's main thought not only as to man but as to most of the mammals. He perhaps carries his conclusions somewhat farther than the facts yet warrant, but that is almost unavoidable when a new step of real importance is taken. He is to be congratulated upon having done a piece of work which is sure to have a wide influence upon future studies of evolution.

ELLSWORTH HUNTINGTON.

PHYTOGEOGRAPHY AND ZOÖGEOGRAPHY

DRUDE, OSCAR. **Die Ökologie der Pflanzen.** (Series: Die Wissenschaft.) x and 308 pp. Ills., index. F. Vieweg & Sohn, Brunswick, 1913. Mk. 10. 8½ x 5½.

Drude's "Ecology of Plants" is an able presentation of the present status of the study of plants in their relation to environmental factors. The descriptive aspects of plant geography have not been touched upon,—in fact there has been no comprehensive treatment of the vegetation of the world since that published by Schimper in 1898, in his "Plant Geography on a Physiological Basis." Drude's volume centers around the vegetative, or physiological, classification of plants, the gross form of plants in relation to physical factors, and the bearing of ecological facts and phenomena on the problems of evolution. These are the freshest phases of ecology, from which much of the future work in the subject will doubtless radiate.

A vegetative classification of plants presents far greater inherent difficulties than does a classification according to phyletic relationship. Drude has presented a very natural

grouping of plants according to form, gross structure, character of foliage, seasonal habits, etc. His system is nearly free from morphological bias,—although *ginkgo* is placed among the "needle-leaved coniferous trees" and the "thermophytes" are separated into monocotyledonous and dicotyledonous.

The essential structures of plants bear relationships to external agencies, which have been well presented in such texts as Haberlandt's "Physiological Plant Anatomy" and Goebel's "Organography." Drude is concerned with these relationships as constituting in themselves one of the most important aspects of ecology and as furnishing also the logical basis for his vegetative classification of plants. This section of the book is notable for its breadth of treatment rather than for its acumen and detail in the discussion of the many physiological functions with which it has to deal. The periodicity of vegetative and reproductive phenomena is discussed, especially with respect to the relative importance of inherent and external causes in actuating the periodicities of tropical plants. The further discussion of climatic factors leads the author to the exposition of a classification of climates, which he has adapted from that of De Martonne and made to answer more closely the requirements of the student of vegetation. The factors other than those of the climate which are important in the differentiation of vegetation are treated under the heading of "physiographic ecology," together with a discussion of the various classificatory units used in the description of vegetation. The concluding chapters cover such subjects as the dissimilar vegetative types of plants to be found within the same genera, the dissimilarity of physical conditions which are often necessary to plants of close relationship, the comparative geographical distribution of members of certain families and genera, and the distribution and habitats of certain plants which throw light on the operation of evolutionary processes.

Drude's book will take a place together with Warming's "Ecology of Plants" as one of the most comprehensive texts on this subject. FORREST SHREVE.

LEVISON, J. J. **Studies in Trees.** 253 pp. Ills., index. J. Wiley & Sons, New York, 1914. $1.60. 8 x 5½.

The book is designed to supply tree lovers in their contact with the trees along shady streets, through grassy parks, over wooded valleys, and in mountain wildernesses, with a manual which in small compass will give the essential principles of tree growth and forestry. The first 105 pages give a general sketch, with illustrations, of the principal forest trees. The remainder of the book deals with such topics as tree structure and diseases, the care of trees and their utilization for decorative purposes, and the principles of forestry. JOHN W. HARSHBERGER.

STEUER, ADOLF. **Leitfaden der Planktonkunde.** 382 pp. Ills., index. B. G. Teubner, Berlin, 1911. Mk. 7. 9½ x 7.

This volume contains chapters on the following topics: waters of the globe; methods of plankton investigation; adaptations among plankton; their vertical distribution; their horizontal distribution; their geographical distribution; their seasonal occurrence; their importance in nature's economy; and their importance to man.

The chapter on water gives a good summary of the waters of the globe,—their chemical composition, phosphoresence, temperature, light, transparency, color, etc., with reference to the life present. Descriptions of the apparatus in making these studies is also given.

The chapter on methods of studying plankton goes into all the details of the study of plankton, whether qualitative or quantitative. Many diagrams make clear the structure and operation of the nets and pumps used. A discussion of the sorts of nets, net coefficients, preservation, statistical studies, and counting methods concludes a very interesting chapter.

The colors of plankton are discussed from the standpoint of the relationship of color to temperature. This leads to the effect of climate and seasonal variation. The author concludes that colorless plankton occurs quite generally; blue and violet in the warmer waters; red, brown, and dark violet in the colder deeper waters.

Many of the illustrations are colored and all are very accurate. This volume will be of great service to all interested in problems concerning the smaller forms of life in the waters of the globe. R. W. SHARPE.

ABEL, OTHENIO. **Die Tiere der Vorwelt.** (Series: Aus Natur und Geisteswelt.) 88 pp. Ills. B. G. Teubner, Leipzig, 1914. Mk. 1.25. 7½ x 5.

ANDREWS, E. C. **The Development and Distribution of the Natural Order Leguminosæ.** Bibliogr. *Journ. and Proceed. Royal Soc. of New South Wales for 1914*, Vol. 48, Part 3, pp. 333-407. Sydney, 1915.

HUMAN GEOGRAPHY

Anthropogeography

Clemenz, Bruno. **Die Inseln im Weltkriege.** *Kartogr. u. Schulgeogr. Zeitschr.*, Vol. 4, 1915, No. 8, pp. 123-126. Vienna.

Skattum, O. J. **Interessesfaererne og de aapne graenser i kolonimagternes politik.** *Norske Geogr. Selskaps Aarbok*, Vol. 25, 1913-1914, pp. 103-117. [On colonial spheres of interest and "open" boundaries.]

Söderlund, Alfred. **Förslag till intensitetsbeteckning vid konstruktion af täthetskartor.** Diagrs. *Ymer*, Vol. 35, 1915, No. 3, pp. 267-272. [Representation of population density by the dot method, using plastic symbols, such as a shaded sphere or cube, to heighten the effect.]

Economic Geography

Waters, H. J. **The Essentials of Agriculture.** x and 455 pp. Ills., index. Ginn & Co., New York, 1915(?). $1.25. 8 x 5½.

A student who completes his study of this book should know much about agriculture in the United States, but he need not have gained a working knowledge of farming or of types of agriculture in our country.

The volume is inclusive in scope, accurate in content, and interesting in its form of presentation. It is well printed and well illustrated. The references to available literature are chosen with care. It is one of the best general books on agriculture available for secondary schools. The topics treated are so numerous and varied that space forbids an adequate treatment of many. For instance, the necessity of cleanliness in handling milk is merely suggested, and no mention is made of the dangers that may arise from unclean milk. Tuberculosis and typhoid fever are noted only under the heading "bacterin" in the chapter on plant diseases.

The types of farming predominating in the several agricultural sections of the United States are not discussed, and thus the book is inadequate for the study of local agricultural operations. It is a volume, like most of its rivals, that may be memorized without the student's getting a real appreciation of the problems arising in any type of farm practice. The basis has now been laid for volumes for secondary schools dealing with farming as an occupation, and this is a different thing from a study of agriculture in an extensive way. Richard Elwood Dodge.

—— **Almonds, The Sources of Supply of.** *Bull. Imper. Inst.*, Vol. 13, 1915, No. 3, pp. 460-470. London.

Gradenwitz, Alfred. **The German Potassium Salts: A Fertilizing Material Indispensable to the Agriculturists of the World.** Ills. *Scientific American Suppl.*, No. 2084, Vol. 80, 1915, Dec. 11, p. 372.

Jones, C. L. **Supplying the World's Coffee.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 5, pp. 129-135.

Lamb, G. N. **Willows: Their Growth, Use, and Importance.** 52 pp. Ills. *U. S. Dept. of Agric. Bull. No. 316.* Washington, 1915.

Macfarlane, J. J. **The World's Paper: A Study of Production and Trade by Continents, Countries, and Classes.** Diagrs. *Commercial Amer.*, Vol. 12, 1915-16, No. 6, pp. 9-17 (odd pages only).

P[hillips], G. C. **The Land: Its "Inherent Capabilities" and How To Secure Their Full Development.** xviii and 126 pp. Diagr. The St. Catherine Press, London, [1913]. 2s. 7½ x 5. [On advisability of crop rotation.]

Renouard, Alfred. **Le commerce de la laine pendant la guerre.** Ills. *La Nature*, No. 2202, 1915, Dec. 11, pp. 369-373.

—— **Sisal Hemp: Its Cultivation, Preparation, and Utilisation.** *Bull. Imper. Inst.*, Vol. 13, 1915, No. 3, pp. 430-446. London.

Todd, J. A. **The War and the World's Cotton Crops.** *Bull. Imper. Inst.*, Vol. 13, 1915, No. 3, pp. 385-392. London.

Travis, Charles, edit. **Railway Rates and Traffic. Translated from the third (1907) edition of C. Colson's "Transports et Tarifs."** (Series: Studies in Economics and Political Science [of the London School of Economics].) 195 pp. Diagrs., index. G. Bell & Sons, Ltd., London, 1914. $1.00. 7½ x 5.

—— **Wolhandel, De, en de wolprijzen in verband met den oorlog.** *Tijdschr. voor Econ. Geogr.*, Vol. 6, 1915, No. 8, pp. 310-315. The Hague.

HISTORY OF GEOGRAPHY AND EXPLORATION

DALL, W. H. **Spencer Fullerton Baird: A Biography. Including Sections from His Correspondence with Audubon, Agassiz, Dana, and Others.** xvi and 462 pp. Ills., index. J. B. Lippincott Co., Philadelphia, 1915. $3.50. 9½ x 7.

Professor Baird was primarily a naturalist and with the necessities and instincts of a naturalist was obliged to take account of geographical features and their effect on the distribution of animals and plants. It is not surprising therefore to find his name among those of the early writers on geographical distribution in America and to discover geographical information of value in his contributions to the natural history of the Mexican Boundary Survey and in the great volumes on mammals and birds which he contributed to the series of Transcontinental Railway Surveys in 1857 and 1858. His painstaking chapter on localities visited by Government expeditions in the early fifties in what was then the Far West has been a blessing to subsequent workers. But Baird's service to geography is not to be measured by his own publications but rather by those of the score of naturalists, geologists, and explorers whose routes and observations were largely based upon his advice.

Baird was a kindly man, always extending a helpful hand to young men interested in the natural sciences. He was a wise counselor, and so modest, sincere, and honest that he held, perhaps longer than any other scientific man, the confidence and esteem of Congress. Few of the younger naturalists and geographers stop to think of the difficulties and meager resources of those who laid the foundations for the work on which they are engaged. Few today realize the extent and comprehensiveness of Baird's contributions to the zoölogy of North America, and only a few of the younger men are aware of the enormous task he set for himself—the preparation of monographic revisions, based on the study of new material, of the mammals, birds, reptiles, batrachians, and fishes of the North American continent.

It was Baird's lot, when entering the prime of life, to be called to the assistant secretaryship, and later the secretaryship of the Smithsonian Institution, in connection with which, and with his later creations, the National Museum and the U. S. Fish Commission, he became so overburdened with public and administrative duties that little time was left for scientific research. Nevertheless his monumental works on mammals and birds were written at odd moments during this trying period. When Commissioner of Fish and Fisheries he planned, and was the means of carrying out, elaborate investigations not only of the natural history of aquatic animals, but of the waters themselves, including the topography of ocean bottoms and the effects of ocean temperatures on the distribution of aquatic animals.

By great good fortune the materials for Baird's biography were placed in the hands of Dr. William H. Dall, for many years an associate and intimate friend. Many letters are given, often introduced and tied together by enlightening remarks, indicating the wide scope of Baird's interests and activities, and showing his relations with Audubon, Agassiz, Henry, Kennicott, Leidy, George P. Marsh, Admiral Farragut, Elisha Kent Kane, and other prominent men of the time.

In reading the volume one is impressed with the feeling that Baird's life was in the main a rather monotonous and self-denying albeit successful struggle to increase the scope and output of scientific research in America and to dignify the position of science in the councils of the Government; and one closes the book with a sense of gratitude to the author and of admiration for the great man whose inspiring example, whose helpfulness to others, and whose energy and patient perseverance accomplished so much for mankind.

C. HART MERRIAM.

—— **Vambéry, Arminius, The Life and Adventures of.** Written by himself. With an appreciation by Max Nordau. xxiv and 316 pp. F. A. Stokes Co., New York, 1914 (?). $1.50. 8 x 5½.

This distinguished Orientalist and traveler, who died in 1913 in the fullness of age and honors, gives in this book the first complete picture in the English language of the manifold adventures of his career. As Vambéry says in his prefatory note, the book contains "a strictly personal narrative of my travels and adventures in Asia and in Europe." The story Vambéry tells is unique because his nature and his talents were exceptional. During six years in Constantinople he acquired some twenty Oriental languages and dialects and then traveled as a dervish through forbidden regions of Central Asia—Khiva, Bokhara, and Samarkand. His disguise was not penetrated; his language, accent, and manner were so perfect that no doubt of his genuineness arose, and he returned to Constantinople with stories of valuable information and the most brilliant record of travel in Central Asia by any European up to that time.

This narrative of his adventures is a fitting supplement to his "Travels in Central

Asia,'' published in 1864, and the eight later works from his pen, because it emphasizes the personality and the pronounced opinions and impressions of the man who did this great work.

SKATTUM, O. J. **David Livingstone.** Map, ills., bibliogr. *Norske Geogr. Selskaps Aarbok*, Vol. 25, 1913-14, pp. 1-24. Christiania.

EDUCATIONAL GEOGRAPHY

WALLIS, B. C. **The Teaching of Geography.** (Series: Cambridge Handbooks for Teachers.) 221 pp. Maps, diagrs., index. Cambridge University Press, Cambridge, and G. P. Putnam's Sons, New York, 1915. 90 cts. 8 x 5½.

This book is devoted to the outlining of an ideal course in geography and to the discussion of methods of making school geography effective. The author would present geography in the following order: descriptive, transitional, systematic, and argumentative. By descriptive geography is meant the study of selected regions through stories so as to lead to a realization of large generalizations, as for instance the larger plant regions of the world; transitional geography is devoted to a study of the home land and distant lands in order to investigate geographic principles; systematic geography is a ''topical'' causal study of regions; and argumentative geography is a consideration of the significance of certain selected types of geographic facts.

The plan of procedure is wholly different from that adopted so widely in America, where school courses begin with ''home geography.'' The author includes many valuable suggestions for ''practical work,'' which has been so prominent in English geography teaching in recent years. The American teacher in normal schools or supervisor of geography teaching will find much that is suggestive and helpful in this volume. RICHARD ELWOOD DODGE.

ADAMS, J. **A Simple Method of Indicating Geographical Distribution.** Diagr. *Science*, No. 1081, Vol. 42, 1915, Sept. 17, pp. 366-368.

BENHAM, C. C. **Types of Laboratory Exercises for High School Geography.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 4, pp. 110-113.

BORGIANI, GIUSEPPE. **Sull' uso dell' articolo con i nomi propri di città.** *La Geogr.*, Vol. 3, 1915, No. 7-10, pp. 347-350. Novara.

HENDERSON, BERTHA. **The Cultural and the Training Value of Geography.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 4, pp. 97-101.

HUBBARD, J. W. **Supplementary Material for Teaching Geography in Elementary Schools.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 5, pp. 136-143.

LYONS, H. G. **The Importance of Geographical Research.** *Geogr. Journ.*, Vol. 46, 1915, pp. 254-269; or *Scottish Geogr. Mag.*, Vol. 31, 1915, pp. 505-519; or *Science*, No. 1087, Vol. 42, 1915, Oct. 29, pp. 585-597. [Presidential address to Section E at the Manchester meeting of the British Association, Sept. 1915: abstracted in the *Bull. Amer. Geogr. Soc.*, Dec., 1915, pp. 964-965.]

PHILIPPSON, ALFRED. **Winke für Geographie Studierende.** *Petermanns Mit.*, Vol. 61, 1915, Dec., pp. 479-480. [Hints to the author's prospective students of geography at the University of Bonn. Admirable, concise statement of the subject-matter and aims of geography.]

REED, W. G. **A Simple Method of Indicating Geographical Distribution.** *Science*, No. 1092, Vol. 42, 1915, Dec. 3, p. 798. [Supplementary to the article by J. Adams, listed above.]

WAGNER, HERMANN. **Die Zukunft des geographischen Unterrichts: Rückblicke und Ausblicke.** *Petermanns Mitt.*, Vol. 61, 1915, Dec., pp. 453-462. [An authoritative summary, by the dean of German geographers, of the status of geographical teaching in Germany, its development in the past, and its prospects in the future. In spite of different conditions, the essential facts are also of interest to us in our development.]